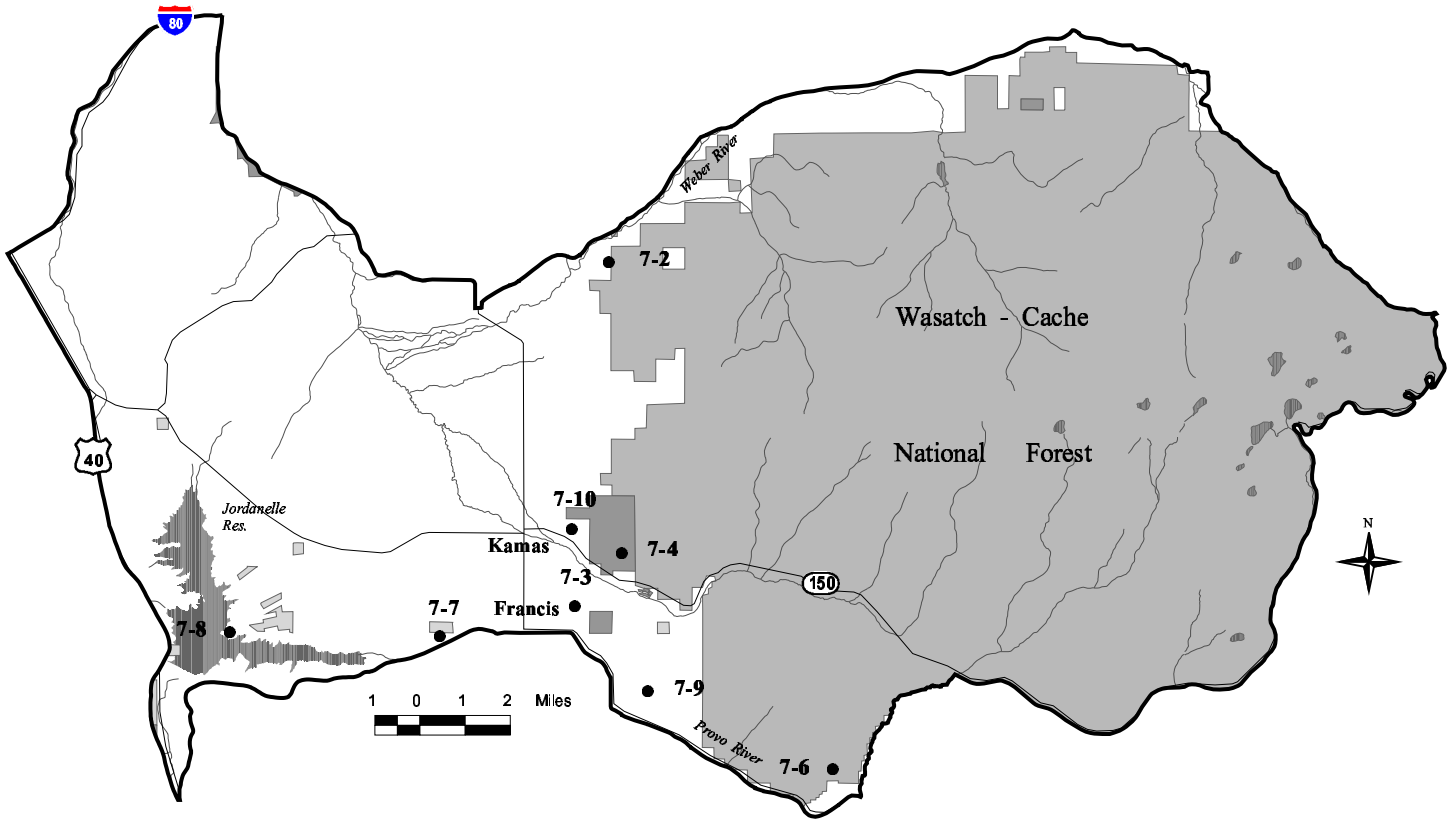
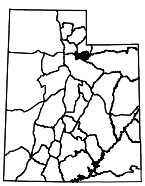
Management Unit 7



Unit Location



- Transect Location
- Roads
- Water Courses

- Forest Service
- BLM
- State of Utah
- Private Land
- Water Body

WILDLIFE MANAGEMENT UNIT 7 - KAMAS

Boundary Description

Summit and Wasatch Counties - Boundary begins at the junction of I-80 and SR-32 (Wanship); south on SR-32 to the Weber Canyon Road at Oakley; east on this road to Holiday Park and the Weber River Trail; east on the Weber River Trail to SR-150 near Pass Lake; south on SR-150 to the North Fork of the Provo river; south along the North Fork of the Provo River to the Provo River; south along the Provo River to SR-35; west on SR-35 to Francis and SR-32; west on SR-32 to US-40 near Jordanelle; north on US-40 to I-80; north on I-80 to SR-32 and Wanship.

Management Unit Description

The Kamas herd unit is located between the Uinta and Wasatch Mountains in the north-central part of the state. The 1977 inventory of the Kamas unit, known as Herd Unit 20 at that time, included a total of 377,532 acres (Giunta 1979). Only about 10% of the range at that time was classified as winter range. Boundary changes in 1985 reduced the total acreage and shifted a portion of the winter range north of the Weber River into the Chalk Creek management unit. There was another realignment of the herd unit boundaries again in 1996, reducing the total acreage by approximately 25%. Even with these changes, the ratio of winter to summer range has stayed basically the same, with about 10% of the area being classified as winter range. The obvious limiting factor for big game in this management unit is the lack of adequate quantities of good quality winter range. With severe winters, the available range is reduced even further. A fairly current example of this problem can be illustrated by the large winter deer losses which occurred during the winter of 1992-93.

As with the Chalk Creek management unit, there is a prevalence of privately-owned land in the Kamas management unit, especially in the most critical low elevation wintering areas. For deer, over 67% of the winter range is under private ownership. The Forest Service manages another 28% of the normal winter range. There is abundant summer range in the Uinta Mountains to the east. These mountains contain the headwaters of the Weber and Provo Rivers, which flow west through the Rhodes and Heber Valleys. The south and west exposures along these rivers, in addition to land along Beaver Creek and the mountain face east and north of Kamas, provide the major deer wintering areas.

Because of the varying topography, the deer winter range is separated into several distinct areas. The upper limits vary considerably, but lower limits generally follow the canyon bottoms, roads, and the upper limits of cultivated land. Wintering areas north of the Weber River, on the Kamas face, Beaver Creek, and the Provo River, have long been recognized as critical to the deer herd on the western edge of the Uinta Mountains. However, there has been a controversy regarding which deer use the Weber River winter range. Data on migration patterns led to the boundary change which shifted this important winter range into the Chalk Creek unit. An area south of Wanship that was surveyed as winter range in 1977 was not considered winter range on the 1984 herd unit map, but the area was sampled with study 7-1 in the past. For a complete and detailed description of all the winter range areas and vegetation types sampled, consult the 1977 Range Inventory (Giunta 1979). The report includes an acreage breakdown by vegetation type and geographic area.

Fourteen different vegetation types were classified, but only nine of the more important types were sampled in the 1977 inventory. Of those, two emerge as the dominant and most valuable types. Together, the oakbrush and sagebrush-grass types occupied more than 70% of the normal winter range. The oakbrush type, dominated by Gambel oak with big sagebrush, serviceberry, and snowberry as the subdominant associates, is often found at the more mesic, higher elevations. The oakbrush range condition, in 1977, was considered generally satisfactory and exhibited light to moderate deer use. Sagebrush-grass, the second most abundant type, often occurs interspersed with the oak type. It normally occupies the lower, especially critical portions

of the winter range. Much of the lower areas have been converted to cropland or are heavily grazed by livestock. Other important types include the rather depleted sagebrush type and a significant mountain brush stand on the south-facing slope of Pinyon Canyon.

Big Game Management Objectives

Current management objectives for deer are to keep the herd in balance with the available range, which includes a yearly harvest of 1,300 bucks with normal conditions. The number of antlerless deer permits would depend on targeted population goals (9,000 wintering deer, modeled number) and condition and trend of the winter range. Management objectives for elk are to achieve a target population size of 650 wintering elk under normal conditions (modeled number), with a bull to cow ratio of 8:100, and with at least 4 of these bulls being 2½ years of age or older. To maintain these target populations, antlerless and either sex permits and a variety of harvest methods and seasons will be used (1998 Utah Big Game Management Plan).

The lack of winter range is the major limiting factor for the deer herd in this unit. A major concern is the continuing loss of habitat to housing and agriculture centered on private lands. Other management concerns for both deer and elk include increases in road building and the resultant highway mortality, minimizing crop depredation by wildlife on private lands, and predation. The construction of Jordanelle Reservoir has inundated several thousand acres of wildlife habitat as well, some of which was important deer winter range. Overuse by both livestock and big game has led to a deteriorating range condition in many critical locations.

The key solution to the deer problems on the herd unit is the protection of the remaining critical winter range. Land purchase in this unit is a high priority of the Division's land acquisition program. The Division has made purchases of critical land east of Kamas in which improvements should be made to enhance the quality of the range. It will be necessary to work with private landowners to discourage overgrazing, and insure hunter access and adequate depredation protection.

Range Trend Studies

There are nine trend studies in management unit 7. Seven of these were established in 1984, and two others were established in 1996. Trend studies in this management unit were reread in 1990, 1996, and 2001. One study, Stevens Hollow (7-1), was discontinued in 2001 by request of the Division biologist who manages the unit. The area surrounding the Stevens Hollow study is undergoing extensive development.

*****Suspended*****

Trend Study 7-1-96

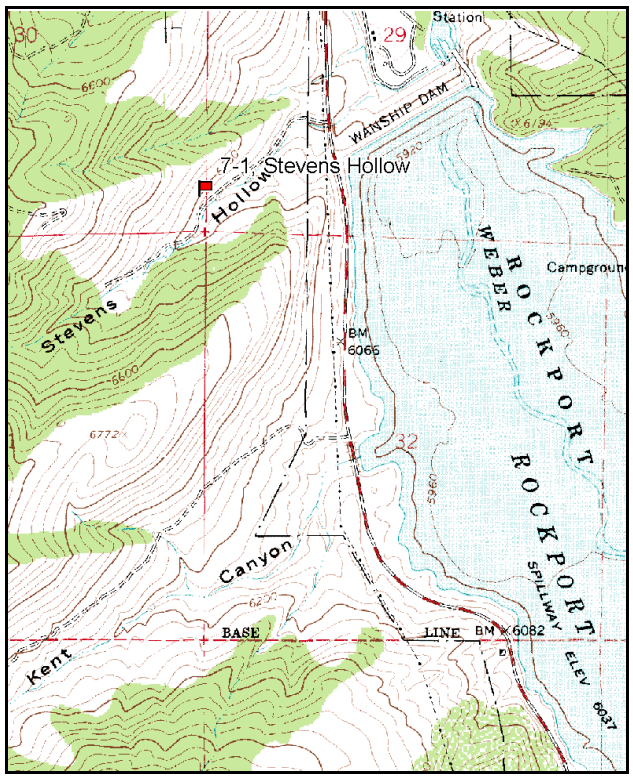
Study site name: Steven's Hollow . Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 167 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

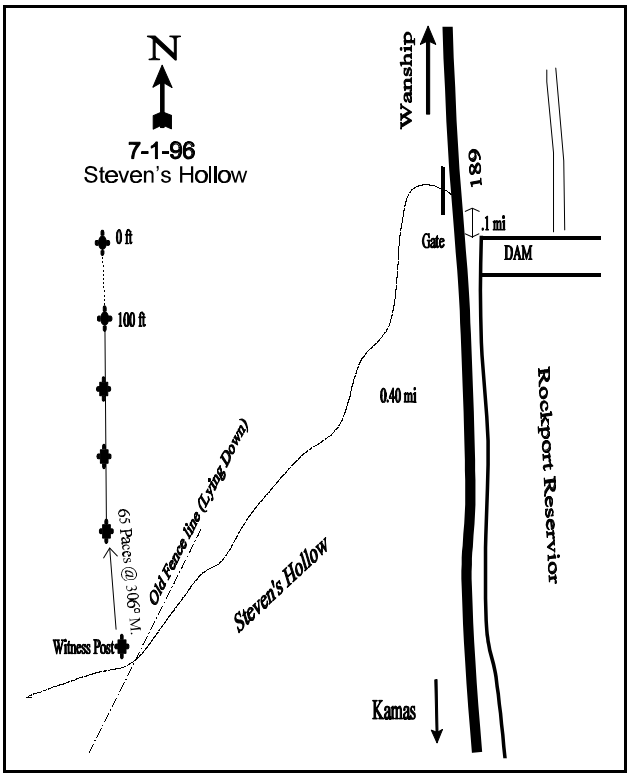
LOCATION DESCRIPTION

From the west side of Wanship dam, travel north 0.1 miles, and turn left to a gated dirt road. Pass through the gate, and continue 0.4 miles to a witness post on the right hand side of the road. From the witness post, walk on a bearing of 306 degrees magnetic for approximately 65 paces up slope to the 400-foot stake of the baseline. The 0-foot baseline stake is 400 feet to the north at a bearing of 347 degrees magnetic. The 0-foot baseline stake is marked by browse tag #7965. The baseline runs 167 degrees magnetic.



Map Name: Wanship

Township 1N , Range 5E , Section 30



Diagrammatic Sketch

UTM 4515161 N 464750 E

DISCUSSION

Trend Study No. 7-1

*******This study was discontinued in 2001 by request of the biologist who manages this unit. Development of the area was the primary reason for this. Maps, data tables, and a site narrative are included from the 1996 volume 2 Utah Big Game Range Trend Studies report.

The Stevens Hollow study is located on a moderately steep (30-35%), southeast-facing slope on the north side of Stevens Hollow. Elevation ranges from about 6,240 feet at the beginning of the transect to perhaps 6,500 feet at the upper end. Stevens Hollow is considered an important deer winter range that receives considerable use, although pellet group frequency currently indicates only light to moderate use by deer. The more palatable browse species in the past showed moderate to heavy use. A recent wildfire eliminated all of the sagebrush. The other preferred species, serviceberry and true mountain mahogany, have since begun to sprout vigorously and show good vigor. This site was originally classified as a typical mountain brush community with the dominating species being true mountain mahogany and mountain big sagebrush. Since the fire however, all of the sagebrush was lost. The area is now dominated by serviceberry and true mountain mahogany, with nearby sprouting Gambel oak clones. Land ownership is private with current use limited to livestock grazing. There is a high potential for future summer home or recreational subdivision development. Kent Canyon, a comparable canyon located immediately to the south, has already been developed.

Soils are moderately deep (effective rooting depth of more than 21 inches) with a clay texture and neutral soil reaction (7.3 pH). Percent cover for rock and bare soil is estimated at 7% and 17% respectively. The soil surface shows signs of being lightly eroded in the shrub interspaces where vegetation and litter cover is limited. Soil trend appears to be stable even with the recent wildfire.

This particular area had a diverse shrub and grass composition in the past, dominated by two preferred browse, mountain big sagebrush and true mountain mahogany. Now, total browse cover is less than 5%. In 1996, the preferred browse was made up of serviceberry, true mountain mahogany, and snowberry which together contributed less than 2% of the total cover. Grasses and forbs provided 42% average cover, or nine times more cover than all the browse put together. The most common herbaceous species is cheatgrass. It now makes up 57% of the total grass cover. Three weedy annual forbs make up 83% of the total forb cover. The herbaceous understory is distinctly characteristic of being dominated by annual weeds making the community more susceptible to wildfire again.

Although shrub species such as Oregon hollygrape and stickyleaf low rabbitbrush didn't appear to influence the plant community much in the past, now with the loss of the sagebrush, there are many open niches for them to quickly become established. With the anticipated increase in weedy shrubs, they will have a greater influence on what the community will be composed of in the future. Broom snakeweed and prickly pear cactus will also most likely increase in numbers. The amount of utilization of the sprouting shrubs will determine their growth form in the future. In the past, most of the preferred browse showed moderate to heavy use.

Grasses have responded well following the fire with a fourfold increase in sum of nested frequency. Sum of nested frequency for forbs has more than doubled since the fire. This increase will have a stabilizing effect on soil condition, but may make it difficult for sagebrush to become as abundant as it was before the fire as much of the increase in herbaceous species comes from annuals.

1984 APPARENT TREND ASSESSMENT

Reviewing the 1977 line intercept data and photo points, it appears that soil trend is stable or perhaps even improving. However, vegetative trend may be declining slightly. The most revealing clues are changes in form class structure of the key browse species and some indications that density of mountain big sagebrush and true mountain mahogany may have declined since 1977. While there is some evidence indicating increases in forage production of these species, this is a subjective conclusion. In addition, age structures of almost all the more palatable browse species occurring within the site appeared to be rather heavily utilized, certainly heavier than in 1977.

1990 TREND ASSESSMENT

This trend study samples winter range on property above Rockport Reservoir controlled by the Weber Basin Water Conservancy District. It was noted in the 1984 report that mountain big sagebrush had decreased since the original 1977 line intercept was read. However in 1990, density was higher due to an increase in the number of young sagebrush. Canopy cover is less in 1990 averaging only 6%. The sagebrush were classified as heavily hedged in 1984. Although the shrubs appear in worse shape now, it is due more to the drought and lack of leader growth than continued heavy use. The true mountain mahogany was also heavily hedged. Half of the population was decadent. The only real increase came for broom snakeweed, which increased significantly on the density portions of the study. Grass frequency is similar between years. The most common forb species are undesirable species such as stickseed, thistle, and bastard toadflax. A slight increase in the percentage of bare soil was recorded, however there is still good vegetative and litter cover.

TREND ASSESSMENT
soil - stable (3)
browse - down (1)
herbaceous understory - stable (3)

1996 TREND ASSESSMENT

This trend study originally sampled a “critical” winter range, has now been largely altered by a recent wildfire. The soil trend would be considered improving with an increase in herbaceous cover even though it is mostly characterized by weeds. Percent bare ground has decreased from 23% to about 17%. The browse trend would be assessed as down with the loss of all the sagebrush to fire. The other preferred browse which are moderately fire tolerant, are in the preliminary stages of sprouting. Vigor appeared to be good on the sprouting species, but condition and trend for browse will not be know for a few years. The herbaceous understory has a stable trend. Perennial grasses increased in sum of nested frequency, while perennials forbs decreased. The majority of the understory is now characterized as annuals and weedy increasers which could eventually cause a greater frequency of possibly destructive fires.

TREND ASSESSMENT
soil - improving (4)
browse - down with the loss of sagebrush to the wildfire (1)
herbaceous understory - stable (3) but composition is poor

HERBACEOUS TRENDS --
Herd unit 07 , Study no: 1

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Agropyron spicatum	$_{a}$38	$_{a}$49	$_{b}$114	21	22	40	7.90
G	Bromus tectorum (a)	-	-	302	-	-	89	16.48
G	Oryzopsis hymenoides	$_{ab}$43	$_{a}$27	$_{b}$46	19	14	27	2.84
G	Poa fendleriana	2	4	1	1	2	1	.03
G	Poa pratensis	-	-	3	-	-	2	.06
G	Poa secunda	$_{a}$32	$_{b}$65	$_{b}$72	20	27	40	1.41
Total for Annual Grasses		0	0	302	0	0	89	16.48
Total for Perennial Grasses		115	145	236	61	65	110	12.25
Total for Grasses		115	145	538	61	65	199	28.73
F	Agoseris glauca	-	-	2	-	-	1	.00
F	Allium acuminatum	$_{a}$2	$_{b}$13	$_{a}$-	1	8	-	-
F	Alyssum alyssoides (a)	-	-	277	-	-	90	5.80
F	Camelina microcarpa (a)	-	-	25	-	-	16	.38
F	Calochortus nuttallii	-	-	1	-	-	1	.00
F	Chaenactis douglasii	$_{b}$14	$_{b}$17	$_{a}$-	7	7	-	-
F	Cirsium spp.	$_{b}$67	$_{b}$71	$_{a}$19	30	34	14	1.55
F	Comandra pallida	$_{b}$97	$_{a}$18	$_{a}$19	39	12	10	.08
F	Crepis acuminata	-	2	-	-	1	-	-
F	Cryptantha spp.	$_{c}$72	$_{b}$20	$_{a}$-	36	8	-	-
F	Cymopterus spp.	-	1	-	-	1	-	-
F	Descurainia pinnata (a)	-	-	20	-	-	13	.21
F	Gayophytum ramosissimum (a)	-	-	3	-	-	2	.01
F	Hackelia patens	$_{a}$-	$_{b}$73	$_{b}$59	-	36	29	3.34
F	Hedysarum boreale	$_{b}$7	$_{a}$-	$_{c}$24	3	-	12	1.43
F	Lactuca serriola	-	-	3	-	-	2	.01
F	Lithospermum ruderale	3	-	-	2	-	-	-
F	Lomatium spp.	-	-	3	-	-	1	.03
F	Penstemon spp.	$_{b}$23	$_{b}$17	$_{a}$-	11	6	-	-
F	Phlox longifolia	$_{a}$-	$_{a}$3	$_{b}$15	-	2	9	.04
F	Ranunculus testiculatus (a)	-	-	13	-	-	5	.02
F	Schoencrambe linifolia	-	-	3	-	-	2	.01
F	Sisymbrium altissimum (a)	-	-	2	-	-	1	.00
F	Tragopogon dubius	-	-	1	-	-	1	.01
Total for Annual Forbs		0	0	340	0	0	127	6.45
Total for Perennial Forbs		285	235	149	129	115	82	6.54
Total for Forbs		285	235	489	129	115	209	13.00

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 1

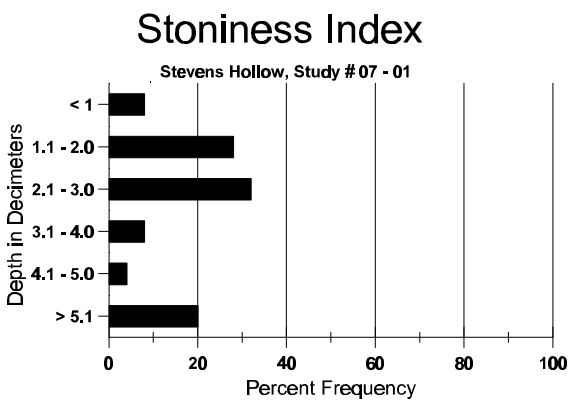
Type	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier alnifolia	13	.81
B	Cercocarpus montanus	13	.72
B	Chrysothamnus viscidiflorus viscidiflorus	48	1.67
B	Gutierrezia sarothrae	29	.72
B	Mahonia repens	8	.25
B	Opuntia spp.	10	.06
B	Symphoricarpos oreophilus	4	.15
B	Tetradymia canescens	9	.39
Total for Browse		134	4.80

BASIC COVER --
Herd unit 07 , Study no: 1

Cover Type	Nested Frequency '96	Average Cover % '84	'90	'96
Vegetation	377	4.25	11.50	48.95
Rock	208	11.00	11.00	7.28
Pavement	75	4.50	3.00	.27
Litter	391	62.75	51.00	52.07
Cryptogams	1	0	.25	.00
Bare Ground	248	17.50	23.25	17.20

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 01, Stevens Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
21.3	67.2 (45.4)	7.3	29.3	26.4	44.4	2.6	6.9	115.2	.5



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 1

Type	Quadrat Frequency '96
Rabbit	5
Deer	17

BROWSE CHARACTERISTICS --
Herd unit 07 , Study no: 1

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	30	-	-	-	-	-	-	-	-	30	-	-	-	600			30
M	84	-	-	1	-	-	-	-	-	-	-	-	1	-	66	28	24	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	12	6	1
	96	4	-	-	1	-	-	-	-	-	5	-	-	-	100	25	35	5
D	84	-	2	1	-	-	-	-	-	-	1	2	-	-	200			3
	90	-	2	1	-	-	1	-	-	-	3	-	-	1	266			4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	50%	50%	25%	+33%
'90	33%	33%	17%	+43%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	266	Dec:		75%
'90	398			67%
'96	700			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	1	4	5	-	-	-	-	-	-	10	-	-	-	666	25	31	10
	90	2	2	-	-	-	-	-	-	-	4	-	-	-	266	19	32	4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	11	-	-	-	-	-	-	9	-	1	1	733			11
	90	2	5	6	-	-	1	-	-	-	8	-	-	6	933			14
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	19%	76%	10%	+ 0%
'90	33%	33%	29%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	1399	Dec:	52%
	'90	1399		67%
	'96	0		0%

Cercocarpus montanus																		
Y	84	1	1	2	-	-	-	-	-	-	3	-	1	-	266			4
	90	1	1	-	-	-	1	-	-	-	3	-	-	-	200			3
	96	6	2	-	4	-	-	-	-	-	12	-	-	-	240			12
M	84	-	2	7	-	-	1	-	-	-	3	7	-	-	666	53	43	10
	90	-	-	3	-	-	-	-	-	-	3	-	-	-	200	35	35	3
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	21	26	3
D	84	-	-	3	-	-	-	-	-	-	1	1	1	-	200			3
	90	-	-	6	-	-	-	-	-	-	6	-	-	-	400			6
	96	1	1	-	-	-	-	-	-	-	1	-	1	-	40			2
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	18%	76%	12%	-29%
'90	08%	83%	00%	-58%
'96	18%	00%	06%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	1132	Dec:	18%
	'90	800		50%
	'96	340		12%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	8	-	-	-	-	-	-	-	-	8	-	-	-	533			8
	96	26	-	-	-	-	-	-	-	-	26	-	-	-	520			26
M	84	34	2	-	-	-	-	-	-	-	36	-	-	-	2400	14	14	36
	90	33	-	-	-	-	-	-	-	-	33	-	-	-	2200	11	12	33
	96	120	2	-	-	-	-	-	-	-	122	-	-	-	2440	11	15	122
D	84	19	-	-	-	-	-	-	-	-	15	-	4	-	1266			19
	90	16	-	-	-	-	-	-	-	-	12	-	-	4	1066			16
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	04%	00%	07%	+ 2%
'90	00%	00%	07%	-22%
'96	01%	00%	.67%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	3732	Dec:		34%
'90	3799			28%
'96	2980			1%

Gutierrezia sarothrae																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	21	-	-	-	-	-	-	-	-	21	-	-	-	1400			21
	96	38	-	-	-	-	-	-	-	-	38	-	-	-	760			38
M	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333	16	17	5
	90	8	-	-	-	-	-	-	-	-	8	-	-	-	533	6	5	8
	96	50	-	-	-	-	-	-	-	-	50	-	-	-	1000	9	10	50
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	-	-	-	1	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+83%
'90	00%	00%	03%	-12%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	333	Dec:		0%
'90	1999			3%
'96	1760			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Mahonia repens																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	83	-	-	-	-	-	3	-	-	86	-	-	-	5733			86
	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560			28
M	84	381	-	-	-	-	-	-	-	-	381	-	-	-	25400	4	4	381
	90	104	-	-	-	-	-	3	-	-	107	-	-	-	7133	3	4	107
	96	34	-	-	4	-	-	-	-	-	38	-	-	-	760	4	8	38

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	-49%
'90	00%	00%	00%	-90%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	25400	Dec:	-
	'90	12866		-
	'96	1320		-

Opuntia spp.																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333	6	13	5
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	7	10	1
	96	15	-	-	-	-	-	-	-	-	15	-	-	-	300	5	12	15
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	-	-	-	1	66			1
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	340			17

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	-20%
'90	00%	00%	25%	+30%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	333	Dec:	0%
	'90	265		25%
	'96	380		11%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	84	2	2	1	-	-	-	-	-	-	5	-	-	-	333	23	23	5
	90	1	1	-	4	-	-	-	-	-	6	-	-	-	400	15	9	6
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12	18	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	40%	20%	00%	+17%
'90	17%	00%	00%	-65%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	333	Dec:		-
'90	400			-
'96	140			-

Tetradymia canescens																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
M	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266	6	15	4
	90	-	10	-	-	-	-	-	-	-	10	-	-	-	666	12	22	10
	96	15	-	-	-	-	-	-	-	-	15	-	-	-	300	12	19	15

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+60%
'90	100%	00%	00%	-28%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	266	Dec:		-
'90	666			-
'96	480			-

Trend Study 7-2-01

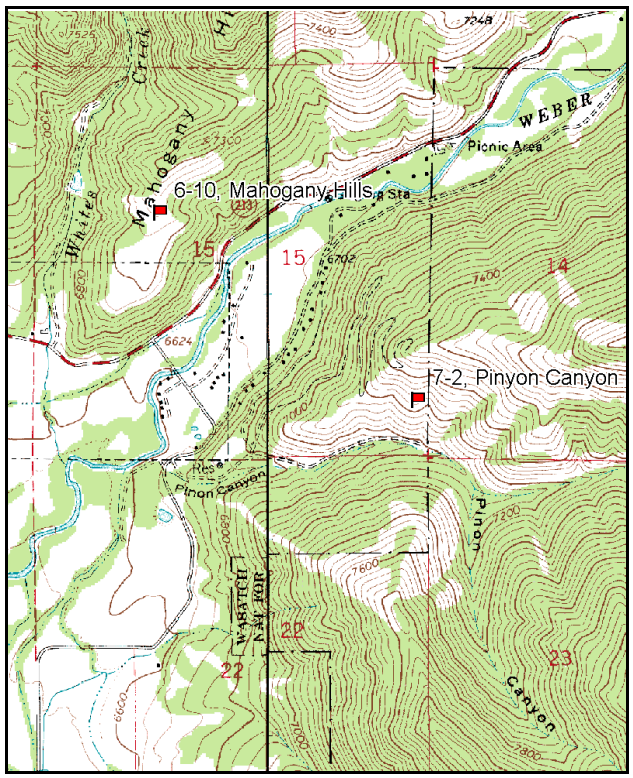
Study site name: Pinyon Canyon . Vegetation type: Mountain Brush .

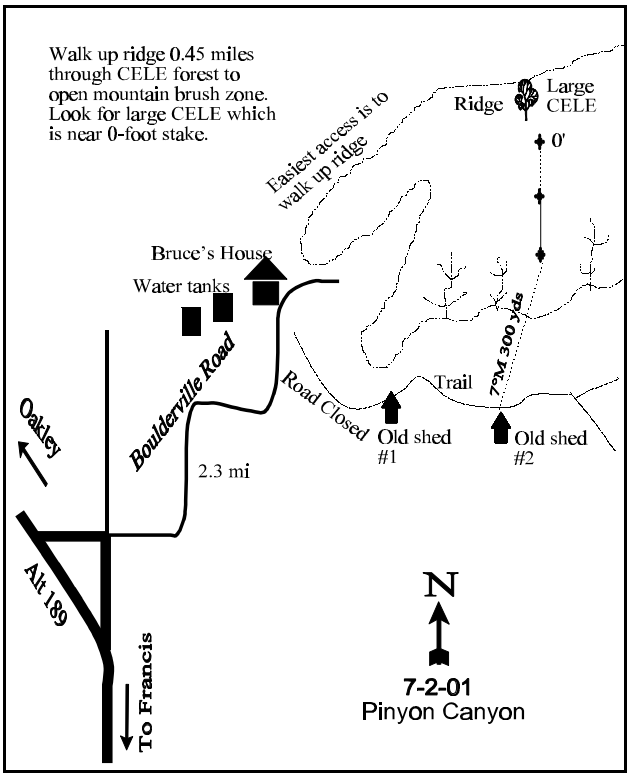
Compass bearing: frequency baseline 180 degrees magnetic.

Frequency belt placement: Line 1 (11, 59, & 95ft), line 2 (34 & 71ft).

LOCATION DESCRIPTION

Where Highway 189 turns northwest between Kamas and Oakley, proceed north for 0.15 miles. At this intersection turn right (east) onto Boulderville Road and travel 2.8 miles. Turn right onto a dirt road proceeding up Pinyon Canyon to a private home, passing two water storage tanks. Contact landowner before proceeding through private land. From the land owners home, walk up the ridge through a Curlleaf mahogany and pinyon forest for about a half mile. As the forest opens up into a mountain brush vegetation type look for a lone, large Curlleaf mahogany on the southwest facing slope. The 0-foot baseline stake is just below this mahogany. The 0-foot stake is marked by browse tag #7957.





Map Name: Hoyt Peak

Diagrammatic Sketch

Township 1S , Range 6E , Section 15

UTM 4508531 N 479481 E

DISCUSSION

Trend Study No. 7-2

The Pinyon Canyon study is located in a drainage containing one of the better and more important mountain brush big game wintering areas in the herd unit. The study extends up a moderately steep (35-40%), south to southwest-facing slope at an elevation of 7,100 feet. This site is rather high for winter range, but with the favorable aspect and slope, the area remains available to big game during all but the most severe winters. Forage utilization appears moderate to heavy. Pellet group quadrat frequencies have indicated that elk utilize the area about three times more than deer. This is supported by pellet group transect data collected in 2001 which estimated 69 elk days use/acre (170 edu/ha) and 30 deer days use/acre (74 ddu/ha). Several moose pellet groups have also been observed on the site, but occurred outside the sampling area. The mountain brush community in this area exhibits considerable variation in overstory dominance. The mixture of shrubs includes varying densities of true mountain mahogany, serviceberry, mountain big sagebrush, antelope bitterbrush, Gambel oakbrush, mountain snowberry, and a few scattered curlleaf mountain mahogany.

Soils are moderately rocky on the surface and throughout the profile. Surface rock and pavement combine to provide nearly 22% average cover in 2001. Parent material appears to be limestone, sandstone, and shale. In places, the soil has a reddish color, indicating a high iron oxide content. Effective rooting depth was estimated at about 12 inches. This should not be a limiting factor to vegetative growth. Soil texture is classified as a loam with a slightly alkaline soil reaction (7.7 pH). Permeability would be moderately slow when combined with the steep slope and high surface rock cover. There is a moderately high potential for runoff and erosion. Vegetation and litter cover are moderately good. Under most conditions this will help prevent erosion from most high intensity summer rain events. A condition class assessment estimated slight soil erosion in 2001.

The browse component is composed of many species that include true mountain mahogany, mountain snowberry, mountain big sagebrush, antelope bitterbrush, Gambel oak, and Saskatoon serviceberry. The browse component provides one-third of the total vegetation cover on the site in 2001, an increase from 23% in 1996. The preferred species, serviceberry, mountain big sagebrush, and true mountain mahogany have on average a markedly reduced decadence in 1996 and 2001 compared to the 1984 and 1990 readings. The level of use exhibited on these species has been moderate to heavy in most readings, with generally less use in the last readings. Utilization on mountain big sagebrush has shown the most improvement since 1984 when heavy use was estimated at 100%. Currently (‘01), use on big sagebrush is light to moderate. Recruitment from young plants has been moderate to high for serviceberry and true mountain mahogany in all samples. Sagebrush recruitment was high in 1996 (37%), but much lower in 2001 at only 7%. In 2001, annual leader growth on serviceberry averaged nearly 4 inches, while mountain mahogany annual leader growth averaged just over 2 inches.

The herbaceous composition consists of an excellent grass cover, dominated primarily by bluebunch wheatgrass. Bluebunch wheatgrass contributed 65% of the grass cover in 1996, but significantly decreased in both frequency and cover in 2001. Sandberg bluegrass is the second most abundant perennial grass on the site, maintaining a stable frequency in 2001. Cheatgrass is also moderately abundant, although in 2001, nested frequency significantly declined with quadrat frequency decreasing from 88% to 73%. These decreases were due to the dry spring of 2001. Forbs occur only occasionally. All forbs combined provide only 9% and 14% of the total vegetation cover on the site in 1996 and 2001respectively. None of the forbs provide significant amounts of forage or ground cover except for rock goldenrod. Species such as yellow salsify, thistle, and rock goldenrod are typical of rocky soils such as those that occur on this study.

1984 APPARENT TREND ASSESSMENT

Soil condition varies widely and depends on small differences in site quality. Although the entire study area is steep and has a basic south or southwest exposure, there are many smaller slopes where exposures are more westerly or easterly. These micro sites have better vegetative cover and appear less eroded. Erosion is obvious within the shrub interspaces on the remaining area. On this site, soil trend is probably only marginally stable. Vegetative trend also seems stable but may vary slightly. The mountain brush community can be expected to maintain itself. However, composition may change slightly. Species such as Gambel oak can be expected to increase, while more palatable and/or less browsing resistant shrubs such as true mountain mahogany and mountain big sagebrush may decline. Although examination of the data summary indicates a population of Oregon hollygrape composed totally of young plants, it is doubtful that this species is a reliable trend indicator or will ever be important as a forage species.

1990 TREND ASSESSMENT

The moderately steep, southwest facing slope is available to big game in most winters. The true mountain mahogany is heavily to severely hedged. Its density has slightly decreased since 1984. The density of young and mature plants also declined slightly, while decadent mahogany shrubs increased to 36% of the population. Contrasting data was found for the serviceberry population. These palatable shrubs are moderately to heavily hedged but have normal vigor. Density is stable to slightly increasing. The percentage of decadent plants decreased from 65% to 11% of the population. Oregon grape is still the most numerous woody species. In comparison with the 1977 line intercept transect data from the same site, mountain big sagebrush continues on the downward trend that was noted in 1984. The moderately dense grass understory of bluebunch wheatgrass and small bluegrasses is almost unchanged. Sum of nested values for perennial forbs slightly increased. Protective soil cover remains adequate.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - improving slightly (4)

1996 TREND ASSESSMENT

The soil trend for this site has improved, with percent bare ground decreasing to less than 15%. There is good herbaceous understory and litter cover which are well dispersed. The key browse for the site, serviceberry, mountain big sagebrush, and true mountain mahogany, provide 59% of the total browse cover. Overall, there has been a decrease in those plants classified as heavily browsed, vigor has improved, and percent decadence has decreased for all key species. Overall, the trend for browse is improving. The herbaceous understory is improved from 1990, with nested frequency increasing for bluebunch wheatgrass. The trend for cheatgrass should be monitored closely.

TREND ASSESSMENT
soil - slightly improved (4)
browse - slightly improved (4)
herbaceous understory - slightly up (4)

2001 TREND ASSESSMENT

Trend for soil is slightly down. With the drought conditions in 2000 and 2001, vegetation and litter cover both decreased, resulting in increased bare ground (14% to 33%). Trend for browse is stable. Serviceberry,

mountain big sagebrush, and true mountain mahogany have stable densities and low decadence. Use remains moderate to heavy on serviceberry and mountain mahogany, but mostly light on mountain big sagebrush. Trend for the herbaceous understory is stable. Bluebunch wheatgrass decreased in nested frequency, but Sandberg bluegrass increased. Perennial forbs increased in sum of nested frequency although they continue to be in low abundance.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 07 , Study no: 2

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	5	-	-	-	2	-	-	-	-	-
G	Agropyron spicatum	$_{ab}$275	$_{a}$266	$_{c}$322	$_{b}$286	93	98	99	93	19.45	11.37
G	Bromus tectorum (a)	-	-	$_{b}$274	$_{a}$215	-	-	88	73	6.51	5.66
G	Poa fendleriana	$_{c}$107	$_{bc}$65	$_{ab}$50	$_{a}$28	46	37	21	13	.67	.60
G	Poa secunda	$_{a}$93	$_{b}$172	$_{b}$175	$_{b}$196	47	73	69	79	3.40	4.27
Total for Annual Grasses		0	0	274	215	0	0	88	73	6.51	5.66
Total for Perennial Grasses		480	503	547	510	188	208	189	185	23.54	16.25
Total for Grasses		480	503	821	725	188	208	277	258	30.05	21.92
F	Agoseris glauca	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$10	-	-	-	5	-	.05
F	Allium acuminatum	$_{b}$34	$_{b}$37	$_{a}$5	$_{b}$50	18	21	2	28	.01	.25
F	Alyssum alyssoides (a)	-	-	$_{a}$28	$_{b}$64	-	-	12	25	.16	.61
F	Astragalus spp.	-	1	-	2	-	1	-	2	-	.01
F	Balsamorhiza sagittata	3	-	-	-	1	-	-	-	-	-
F	Camelina microcarpa (a)	-	-	$_{b}$117	$_{a}$51	-	-	44	25	.61	.23
F	Calochortus nuttallii	6	3	-	4	3	2	-	3	-	.01
F	Chaenactis douglasii	$_{b}$6	$_{c}$28	$_{b}$13	$_{a}$-	2	14	5	-	.05	-
F	Chenopodium fremontii (a)	-	-	-	1	-	-	-	1	-	.00
F	Cirsium undulatum	$_{b}$41	$_{b}$40	$_{a}$9	$_{a}$12	19	20	4	5	.10	.54
F	Comandra pallida	24	21	26	21	8	9	12	9	.23	.31
F	Collinsia parviflora (a)	-	-	-	2	-	-	-	1	-	.00
F	Crepis acuminata	-	3	1	2	-	2	1	1	.03	.03
F	Cymopterus spp.	-	-	2	5	-	-	1	4	.03	.36
F	Descurainia pinnata (a)	-	-	-	7	-	-	-	4	-	.07
F	Epilobium brachycarpum (a)	-	-	-	9	-	-	-	4	-	.02
F	Erigeron pumilus	-	-	2	2	-	-	1	2	.15	.03
F	Erigeron strigosis	-	-	2	-	-	-	1	-	.00	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Gayophytum ramosissimum (a)	-	-	6	-	-	-	3	-	.01	-
F	Gilia spp. (a)	-	-	-	4	-	-	-	1	-	.00
F	Helianthus spp.	-	-	7	-	-	-	3	-	.06	-
F	Holosteum umbellatum (a)	-	-	8	8	-	-	3	3	.09	.01
F	Ipomopsis aggregata	-	-	-	2	-	-	-	1	-	.00
F	Lomatium spp.	-	-	1	-	-	-	1	-	.01	-
F	Microsteris gracilis (a)	-	-	$_{a}$-	$_{b}$68	-	-	-	29	-	.24
F	Penstemon humilis	14	22	19	11	7	10	9	6	.43	.27
F	Petradoria pumila	$_{ab}$41	$_{b}$61	$_{ab}$38	$_{a}$34	19	25	15	14	1.62	1.86
F	Phlox longifolia	-	-	1	-	-	-	1	-	.00	-
F	Polygonum douglasii (a)	-	-	3	-	-	-	1	-	.00	-
F	Ranunculus testiculatus (a)	-	-	$_{a}$8	$_{b}$47	-	-	5	19	.02	.41
F	Streptanthus cordatus	-	3	-	-	-	1	-	-	-	-
F	Tragopogon dubius	$_{a}$4	$_{a}$-	$_{a}$7	$_{b}$21	2	-	4	11	.09	.38
F	Unknown forb-perennial	-	2	-	-	-	1	-	-	-	-
F	Viguiera multiflora	2	3	-	5	1	2	-	2	-	.03
F	Zigadenus paniculatus	-	1	-	-	-	1	-	-	-	-
Total for Annual Forbs		0	0	170	261	0	0	68	112	0.91	1.63
Total for Perennial Forbs		175	225	133	181	80	109	60	93	2.84	4.18
Total for Forbs		175	225	303	442	80	109	128	205	3.75	5.82

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 2

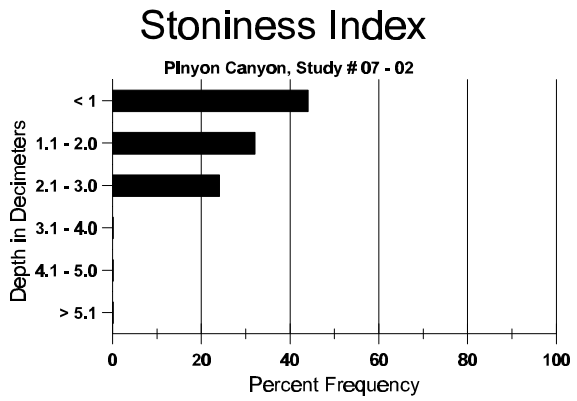
Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	27	25	1.41	.66
B	Artemisia tridentata vaseyana	17	13	.68	1.86
B	Cercocarpus montanus	35	32	3.99	4.24
B	Chrysothamnus viscidiflorus viscidiflorus	0	0	-	-
B	Gutierrezia sarothrae	3	0	.18	-
B	Mahonia repens	3	4	.15	.24
B	Purshia tridentata	4	3	1.14	1.66
B	Quercus gambelii	1	3	.33	.93
B	Symphoricarpos oreophilus	19	19	2.37	3.75
Total for Browse		109	99	10.26	13.35

BASIC COVER --
Herd unit 07 , Study no: 2

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	375	346	3.50	9.50	43.43	39.25
Rock	284	296	23.00	25.25	17.19	15.94
Pavement	222	274	8.25	4.00	6.61	5.94
Litter	393	351	45.75	40.00	41.18	30.26
Cryptogams	33	10	1.75	0	.39	.15
Bare Ground	249	310	17.75	21.25	14.82	33.31

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 02, Pinyon Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.9	60.3 (11.0)	7.7	40.6	32.4	27.0	3.8	8.4	89.6	.8



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 2

Type	Quadrat Frequency	
	'96	'01
Elk	32	43
Deer	11	14

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
01	01
896	69 (170)
392	30 (74)

BROWSE CHARACTERISTICS --
Herd unit 07 , Study no: 2

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	2	-	-	-	-	-	-	2	-	1	-	200			3
	90	4	-	-	2	-	-	2	-	-	8	-	-	-	533			8
	96	11	10	-	-	-	-	-	-	-	21	-	-	-	420			21
	01	30	2	-	-	-	-	-	-	-	30	-	2	-	640			32
M	84	-	1	2	-	-	-	-	-	-	2	-	1	-	200	27	21	3
	90	-	3	3	-	-	-	2	-	1	9	-	-	-	600	22	22	9
	96	-	7	4	5	8	1	-	-	-	25	-	-	-	500	29	37	25
	01	1	8	7	-	2	5	-	-	-	23	-	-	-	460	30	39	23
D	84	-	-	11	-	-	-	-	-	-	2	-	7	2	733			11
	90	-	-	1	-	1	-	-	-	-	2	-	-	-	133			2
	96	-	-	1	-	-	-	-	-	-	-	-	-	1	20			1
	01	-	-	1	6	-	1	-	-	-	1	-	-	7	160			8
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	06%	88%	65%	+11%
'90	21%	26%	00%	-26%
'96	53%	13%	02%	+25%
'01	19%	22%	14%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	1133	Dec:		65%
'90	1266			11%
'96	940			2%
'01	1260			13%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	6	1	-	-	-	-	-	-	-	7	-	-	-	140			7
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66	24	20	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	4	-	-	1	-	-	-	-	8	-	-	-	160	21	31	8
	01	8	2	-	1	-	-	-	-	-	10	-	1	-	220	22	34	11
D	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	2	-	1	1	-	-	-	-	2	-	-	2	80			4
	01	2	-	-	-	-	-	-	-	-	1	1	-	-	40			2
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	100%	00%	-50%
'90	100%	00%	00%	+83%
'96	47%	00%	11%	-26%
'01	14%	00%	07%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'84	132		50%
	'90	66		100%
	'96	380		21%
	'01	280		14%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus montanus																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	90	3	2	-	-	-	-	-	-	-	5	-	-	-	333			5
	96	6	3	-	-	1	-	-	-	-	10	-	-	-	200			10
	01	5	1	-	-	-	-	-	-	-	6	-	-	-	120			6
M	84	-	-	5	-	-	1	-	-	-	6	-	-	-	400	46	28	6
	90	-	-	4	-	-	-	-	-	-	4	-	-	-	266	42	27	4
	96	-	9	12	-	4	3	-	-	-	23	5	-	-	560	34	40	28
	01	1	9	11	-	1	5	-	-	-	26	1	-	-	540	34	37	27
D	84	-	-	3	-	-	-	-	-	-	3	-	-	-	200			3
	90	-	-	5	-	-	-	-	-	-	5	-	-	-	333			5
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	2	3	-	-	-	-	-	-	5	-	-	-	100			5
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	56%	00%	-13%
'90	14%	64%	00%	-16%
'96	44%	41%	00%	- 3%
'01	34%	50%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	1066	Dec:		19%
'90	932			36%
'96	780			3%
'01	760			13%

Chrysothamnus viscidiflorus viscidiflorus

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14	21	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19	27	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'84	0	Dec:	-
'90	0		-
'96	0		-
'01	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140	7	10	7
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	9	32	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		-
'90	0			-
'96	140			-
'01	0			-

Mahonia repens																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	129	-	-	-	-	-	-	-	-	129	-	-	-	8600			129
	90	72	-	-	-	-	-	-	-	-	72	-	-	-	4800			72
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	83	-	-	-	-	-	2	-	-	85	-	-	-	5666	4	4	85
	96	15	-	-	-	-	-	-	-	-	15	-	-	-	300	4	5	15
	01	34	-	-	-	-	-	-	-	-	34	-	-	-	680	4	6	34

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+18%
'90	00%	00%	00%	-96%
'96	00%	00%	00%	+44%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'84	8600	Dec:	-
'90	10466		-
'96	380		-
'01	680		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	9	3	-	-	-	-	-	-	12	-	-	-	240	19	47	12
	01	-	3	-	-	-	-	-	-	-	3	-	-	-	60	22	84	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	75%	25%	00%	-75%
'01	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	240		-
	'01	60		-

Quercus gambelii																		
Y	84	6	-	-	-	-	-	-	-	-	6	-	-	-	400			6
	90	8	9	-	-	-	-	1	-	-	18	-	-	-	1200			18
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	2	5	12	-	-	2	-	-	-	21	-	-	-	1400	47	19	21
	90	1	10	-	-	-	-	-	-	-	11	-	-	-	733	43	29	11
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	64	65	0
	01	1	-	-	5	-	-	-	-	-	6	-	-	-	120	58	34	6
D	84	-	-	3	-	-	3	-	-	-	6	-	-	-	400			6
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	15%	61%	00%	-12%
'90	66%	00%	00%	-99%
'96	00%	00%	00%	+83%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	2200	Dec:	18%
	'90	1933		0%
	'96	20		0%
	'01	120		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Sambucus cerulea																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	28	66	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	0		-
	'01	0		-

Symphoricarpos oreophilus																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	2	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	400			6
	96	7	-	-	1	-	-	-	-	-	8	-	-	-	160			8
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	2	12	1	-	-	-	-	-	-	15	-	-	-	1000	22	23	15
	90	7	8	-	2	-	-	-	-	-	17	-	-	-	1133	21	26	17
	96	12	8	-	2	-	-	-	-	-	22	-	-	-	440	18	33	22
	01	18	3	-	-	-	-	-	-	-	21	-	-	-	420	20	43	21
D	84	-	3	2	-	-	-	-	-	-	5	-	-	-	333			5
	90	3	6	-	-	-	-	1	-	-	9	-	-	1	666			10
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	65%	13%	00%	+30%
'90	42%	00%	03%	-73%
'96	27%	00%	00%	-30%
'01	14%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	1533	Dec:	22%
	'90	2199		30%
	'96	600		0%
	'01	420		0%

Trend Study 7-3-01

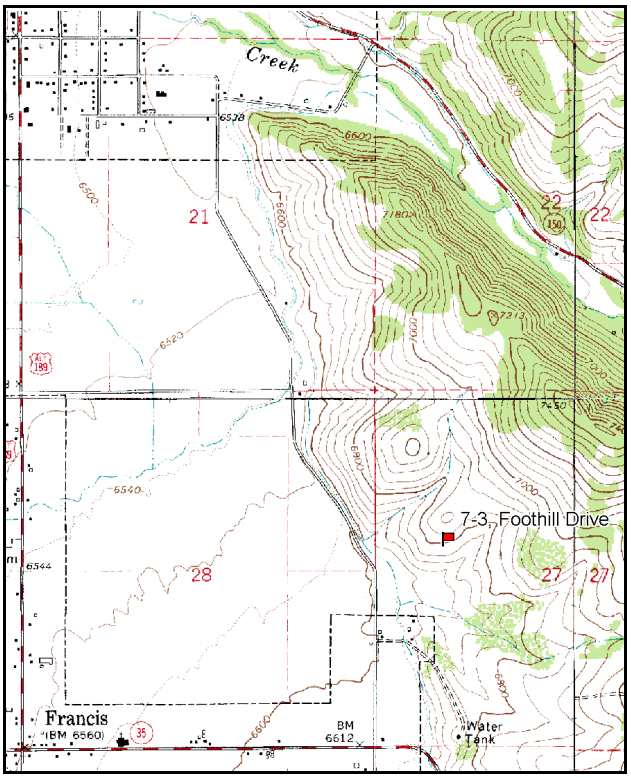
Study site name: Foothill Drive . Vegetation type: Big Sagebrush-Grass .

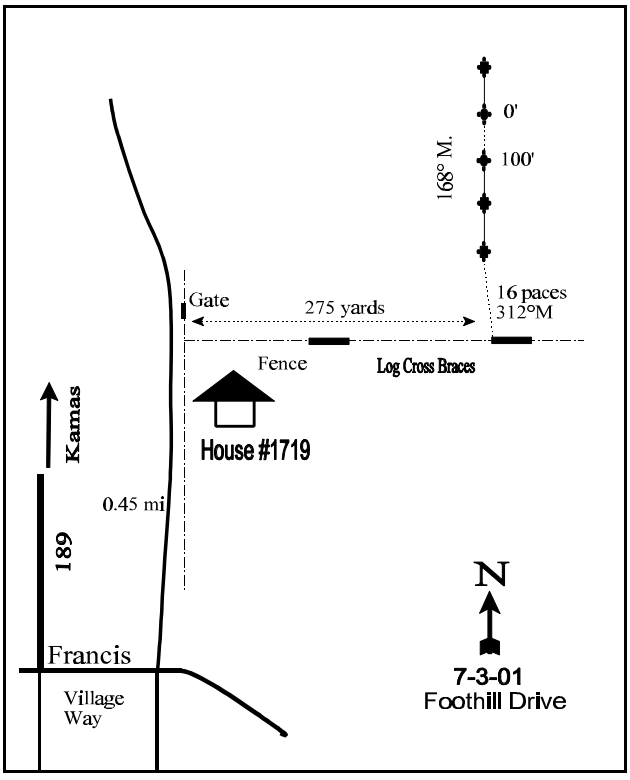
Compass bearing: frequency baseline 168 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

At the junction of 189 and Village Way in Francis, proceed east for 1.0 mile. Turn left (north) onto Foothill Drive, and proceed 0.45 miles to house #1719 on the right. Park here and walk east along the east-west running fence, just north of the house, for approximately 275 yards to the second large log cross-brace on the fence. Walk 16 paces at 312 degrees magnetic to the 300-foot baseline stake. Three hundred feet to the north at a bearing of 348 degrees magnetic is the 0-foot baseline stake. The 0-foot stake is marked by browse tag #7958. The first 300 feet of the baseline runs 168 degrees magnetic. Line 4 runs off the 0-foot baseline stake at a bearing of 348 degrees magnetic.





Map Name: Francis

Diagrammatic Sketch

Township 2S , Range 6E , Section 27

UTM 4496275 N 478254 E

DISCUSSION

Trend Study No. 7-3

The Foothill Drive study is located southeast of Kamas and north of the Provo River on critical deer winter range. This study samples an open mountain big sagebrush-grass ridge that is surrounded by adjacent ridges dominated by Gambel oakbrush. The Kamas area is dominated by intermixed communities of sagebrush-grass and Gambel oakbrush. Slope on the site is moderately steep (30%), aspect is to the southeast, and elevation is approximately 6,900 feet. Animal use during winter comes from deer and to a lesser extent elk. Domestic cattle use the area in spring and summer. The overall intensity of use has been heavy in the past and the impact of grazing and browsing animals is evident. The field crew in 1984 observed the remains of seven winter-killed deer in the immediate study area. Pellet group transect data collected from 2001, estimated 56 deer days use/acre (139 ddu/ha) on the site. Use by elk and cattle was low in 2001 at an estimated 2 elk days use/acre (5 edu/ha) and 7 cow days use/acre (16 cdu/ha).

Soils are clay loam in texture and a slightly acidic soil reaction (6.4 pH). Soil depth is quite shallow due to the abundance of rock on the soil surface and in the profile. Effective rooting depth was estimated at only 9 inches (refer to methods section) in 1996. Vegetation and litter cover are moderately good further up the slope, and coupled with the high amount of surface rock cover (37%), erosion is mostly minimal. However, protective cover at the bottom of the slope is poor where there has been noticeable trampling damage from cattle. An erosion condition class assessment showed stable soils in 2001. Bare ground is low being estimated at less than 5% in 1996 and 2001.

This area initially contained a moderately dense stand of heavily utilized and decadent mountain big sagebrush. In 1984, approximately 84% of the population was classified as heavily browsed. The level of use has steadily declined with each reading, where currently (‘01) use is mostly light. Sagebrush vigor has been generally good, except in 1984, when 33% of the population showed poor vigor. Decadence in the sagebrush population has drastically improved on this site since it was initially read in 1984. Percent decadence was estimated at 90% in 1984, decreasing to 17% in 2001. The population appears to have undergone a period of thinning during the mid-80's and early-90's due to a drier climatic cycle compared to the wet years of the early-80's. Sagebrush density has since stabilized at about 1,200 plants/acre. Annual leader growth on sagebrush averaged 2.2 inches in 2001. Sagebrush contributed 64% of the browse cover on this site in 2001.

Most of the other browse on this site consists of low value increasers including broom snakeweed, Oregon hollygrape, Woods rose, prickly pear, and dwarf rabbitbrush. A few isolated, heavily browsed serviceberry plants are also found on the site.

The herbaceous understory provides three-fourths of the total vegetation cover on the site, although composition is dominated by annuals and weeds. Cheatgrass is especially abundant as it contributes about 70% of the grass cover and one-fourth of the total vegetative cover in 1996 and 2001. Cheatgrass is spread uniformly over the site and thus poses a fire hazard, especially for the key browse, mountain big sagebrush which is not fire tolerant. Kentucky bluegrass is the most abundant perennial grass on the site, significantly increasing in nested frequency in 2001. Showy goldeneye was the most abundant perennial forb in 1996, but this species significantly decreased in 2001. Louisiana sagebrush and hairy goldaster were the most abundant perennial forbs in 2001, both significantly increasing in nested frequency. Abundant annual forbs include storksbill and willowweed.

1984 APPARENT TREND ASSESSMENT

Although some erosion is discernible in the area, it is within acceptable limits and is not a significant factor affecting the potential plant community. Soil trend appears stable. Vegetative trend on the lower portions of the site and the more favorable exposures appears down. This is part of the site that was sampled by the 1977 line intercept study. This area is quickly losing it's mountain big sagebrush component. Photo point comparisons, line intercept comparisons, and the density data all point to a continuing decline of mountain big sagebrush and a concurrent increase of herbaceous plants, especially Kentucky bluegrass and a variety of forbs. On the upper areas (i.e., above 6,800 feet) this trend is not so noticeable and deer use is markedly less. Presumably, snow depth is great enough to discourage the heavier use occurring slightly lower on the slope.

1990 TREND ASSESSMENT

This study is located on a sagebrush slope above a privately-owned pasture. Mountain big sagebrush is the key species for deer on this critical winter range. The 1984 reading found a highly decadent (90%) and apparently declining population. In 1990, although there are still dying shrubs, it appears that the sagebrush population is stabilizing. There is an abundance of sagebrush seedlings (43%), and percent decadence decreased to 45%. Use also declined to a more moderate level with improved vigor. Sagebrush cover is variable, but averages 6% across the site. One negative change since 1984 is the great increase in the density of broom snakeweed. Nested frequency of Kentucky bluegrass declined significantly with the extended drought (1987- 1990). There was an increase in nested frequency for thistle, but low fleabane, Louisiana sagebrush, and showy goldeneye also increased. The percentage of surface rock cover has increased, indicating some continued soil movement.

TREND ASSESSMENT
soil - stable (3)
browse - up (5)
herbaceous understory - stable overall (3)

1996 TREND ASSESSMENT

The soil trend is slightly up with a decrease in bare ground with almost 75% of the vegetative cover coming from herbaceous species. The major drawback is that most of the herbaceous cover is provided by “weedy species.” These species provide high amounts of fine fuel that could provide the stimulus for a destructive wildfire where all the sagebrush could be lost. The browse trend is limited to only one species, mountain big sagebrush. It has decreased significantly in density and average height, but it now appears to have stabilized with improved vigor and decreased decadence. All these parameters indicate a stable population. The herbaceous understory is made up of weedy increasers. Annuals and biennials dominate this site. Trend for perennial grasses and forbs is stable with sum of nested frequency for all perennial species remaining stable.

TREND ASSESSMENT
soil - slightly up (4)
browse - stable (3)
herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is stable, even with a slight increase in bare ground and a decrease litter cover. Protective ground cover provided by vegetation and litter remains well disbursed and erosion is minimal. The high proportion of surface rock also helps armor the soil surface. Trend for browse is stable. Mountain big sagebrush has a stable density, percent decadence slightly decreased, and use is mostly light. The number of

young sagebrush remains stable at 10% of the population. Trend for the herbaceous understory is stable. Nested frequency of Kentucky bluegrass significantly increased, while showy goldeneye significantly decreased. Annuals are abundant.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 07 , Study no: 3

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	14	17	19	15	5	9	7	7	.30	.41
G	Bromus japonicus (a)	-	-	150	123	-	-	46	48	2.35	1.10
G	Bromus tectorum (a)	-	-	298	292	-	-	88	96	10.20	10.08
G	Poa pratensis	$_{c}$138	$_{ab}$91	$_{a}$54	$_{b}$100	50	36	25	38	1.06	2.16
G	Poa secunda	48	41	59	42	24	18	25	18	1.25	.43
Total for Annual Grasses		0	0	448	415	0	0	134	144	12.55	11.19
Total for Perennial Grasses		200	149	132	157	79	63	57	63	2.61	3.00
Total for Grasses		200	149	580	572	79	63	191	207	15.17	14.20
F	Allium spp.	-	-	-	2	-	-	-	1	-	.00
F	Antennaria rosea	-	3	-	-	-	1	-	-	-	-
F	Arabis spp.	-	-	-	5	-	-	-	3	-	.01
F	Artemisia ludoviciana	$_{a}$10	$_{ab}$28	$_{b}$36	$_{c}$67	4	12	15	23	2.03	3.72
F	Aster spp.	5	-	3	-	3	-	1	-	.03	-
F	Astragalus spp.	9	-	-	2	4	-	-	1	-	.00
F	Cirsium undulatum	$_{b}$51	$_{c}$94	$_{ab}$47	$_{a}$16	30	43	20	9	1.09	1.32
F	Collomia linearis (a)	-	-	-	3	-	-	-	1	-	.00
F	Comandra pallida	3	-	-	-	1	-	-	-	-	-
F	Collinsia parviflora (a)	-	-	$_{a}$-	$_{b}$7	-	-	-	5	-	.02
F	Crepis acuminata	1	-	-	-	1	-	-	-	-	-
F	Cryptantha spp.	10	3	1	2	5	2	1	1	.00	.00
F	Descurainia pinnata (a)	-	-	-	2	-	-	-	1	-	.00
F	Draba spp. (a)	-	-	2	-	-	-	1	-	.00	-
F	Epilobium brachycarpum (a)	-	-	$_{b}$164	$_{a}$81	-	-	61	30	2.44	.41
F	Erodium cicutarium (a)	$_{a}$18	-	$_{a}$20	$_{b}$220	7	-	10	72	.27	7.85
F	Erigeron pumilus	$_{a}$-	$_{c}$37	$_{b}$11	$_{a}$-	-	18	7	-	.40	-
F	Eriogonum racemosum	9	6	9	16	4	2	5	8	.13	.60
F	Grindelia squarrosa	-	-	-	3	-	-	-	1	-	.00

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Heterotheca villosa	$_{a}$-	$_{b}$15	$_{b}$31	$_{c}$55	-	8	13	23	1.60	4.15
F	Holosteum umbellatum (a)	-	-	59	41	-	-	23	17	.44	.11
F	Lactuca serriola	$_{a}$-	$_{ab}$7	$_{b}$22	$_{a}$1	-	4	9	1	.07	.00
F	Lepidium spp. (a)	-	-	$_{b}$38	$_{a}$8	-	-	18	4	.16	.07
F	Lupinus argenteus	$_{b}$15	$_{b}$12	$_{a}$-	$_{a}$-	7	8	-	-	.00	-
F	Machaeranthera canescens	2	-	-	-	2	-	-	-	-	-
F	Marrubium vulgare	-	-	-	-	-	-	-	-	-	.03
F	Phlox longifolia	-	-	-	1	-	-	-	1	-	.00
F	Polygonum douglasii (a)	-	-	17	8	-	-	9	4	.04	.07
F	Potentilla gracilis	-	-	2	2	-	-	1	1	.00	.00
F	Ranunculus testiculatus (a)	-	-	-	3	-	-	-	1	-	.00
F	Sphaeralcea grossulariaefolia	-	-	1	-	-	-	1	-	.00	-
F	Tragopogon dubius	3	2	11	9	3	2	6	4	.05	.04
F	Verbascum thapsus	-	-	5	-	-	-	2	-	.33	-
F	Viguiera multiflora	$_{a}$3	$_{b}$63	$_{c}$115	$_{a}$21	3	31	51	12	3.50	.73
Total for Annual Forbs		18	0	300	373	7	0	122	135	3.37	8.56
Total for Perennial Forbs		121	270	294	202	67	131	132	89	9.27	10.66
Total for Forbs		139	270	594	575	74	131	254	224	12.64	19.23

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 3

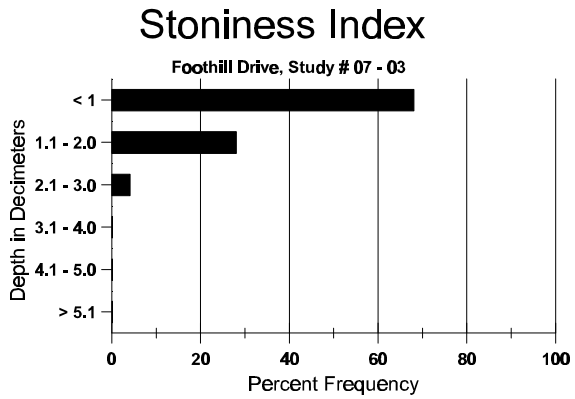
Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	1	2	.15	.06
B	Artemisia tridentata vaseyana	42	39	5.77	7.40
B	Chrysothamnus depressus	3	2	.03	-
B	Gutierrezia sarothrae	52	55	2.41	1.66
B	Mahonia repens	28	29	.42	1.12
B	Opuntia spp.	13	17	.21	.45
B	Rosa woodsii	6	7	.59	.81
Total for Browse		145	151	9.60	11.51

BASIC COVER --
Herd unit 07 , Study no: 3

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	368	362	3.00	5.50	40.96	47.83
Rock	336	320	29.00	34.25	32.87	37.01
Pavement	145	161	1.00	2.50	1.21	3.64
Litter	377	360	52.50	50.50	41.41	30.40
Cryptogams	28	-	.75	.75	.31	0
Bare Ground	129	145	13.75	6.50	1.34	4.97

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 03, Foothill Drive

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
9.0	57.4 (9.8)	6.4	42.2	29.1	28.7	5.0	27.4	243.2	.6



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 3

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre ⁄01	Days Use per Acre (ha) ⁄01
Rabbit	-	7	96	N/A
Deer	23	11	731	56 (139)
Cattle	7	-	78	7 (16)
Elk	-	-	26	2 (5)
Horse	-	-	9	N/A

BROWSE CHARACTERISTICS --
Herd unit 07 , Study no: 3

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	19	29	1
	01	-	1	-	-	-	1	-	-	-	2	-	-	-	40	30	37	2
D	84	-	-	1	-	-	-	-	-	-	1	-	-	-	33			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	100%	00%	+ 0%
'90	100%	00%	00%	-39%
'96	100%	00%	00%	+50%
'01	50%	50%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	33	Dec:		100%
'90	33			0%
'96	20			0%
'01	40			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	84	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	90	25	-	-	-	-	-	-	-	-	25	-	-	-	833			25
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	200			6
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	84	-	1	4	-	-	-	-	-	-	5	-	-	-	166	15	13	5
	90	13	12	1	-	-	-	-	-	-	25	1	-	-	866	27	28	26
	96	27	13	1	-	-	-	-	-	-	41	-	-	-	820	18	34	41
	01	41	2	-	-	-	-	-	-	-	43	-	-	-	860	21	38	43
D	84	-	7	37	-	-	-	-	-	-	28	-	8	8	1466			44
	90	6	17	3	-	-	-	-	-	-	18	4	-	4	866			26
	96	6	6	-	-	-	-	-	-	-	12	-	-	-	240			12
	01	8	1	1	-	-	-	-	-	-	5	-	-	5	200			10
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	660			33
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	200			10

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	16%	84%	33%	+16%
'90	50%	07%	07%	-39%
'96	32%	02%	00%	+ 0%
'01	05%	02%	08%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	1632	Dec:		90%
'90	1932			45%
'96	1180			20%
'01	1180			17%

Chrysothamnus depressus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	1	-	-	-	-	-	-	-	4	-	-	-	80	9	18	4
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	25%	00%	00%	-50%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'84	0	Dec:	-
'90	0		-
'96	80		-
'01	40		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	110	-	-	-	-	-	-	-	-	110	-	-	-	3666			110
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	33	-	-	-	-	-	-	-	-	33	-	-	-	1100	9	12	33
	90	208	-	-	-	-	-	-	-	-	208	-	-	-	6933	9	13	208
	96	209	-	-	-	-	-	-	-	-	209	-	-	-	4180	9	12	209
	01	130	-	-	-	-	-	-	-	-	130	-	-	-	2600	9	12	130
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	4	-	-	-	-	-	-	-	-	3	-	-	1	80			4
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+90%
'90	00%	00%	00%	-59%
'96	00%	00%	00%	-39%
'01	00%	00%	.74%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	1100	Dec:	0%
	'90	10599		0%
	'96	4360		0%
	'01	2680		3%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Mahonia repens																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	-	1	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	28	-	-	-	-	-	-	-	-	28	-	-	-	933			28
	90	34	-	-	-	-	-	-	-	-	11	23	-	-	1133			34
	96	18	-	-	-	-	-	-	-	-	18	-	-	-	360			18
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133	4	3	4
	96	143	-	-	2	-	-	-	-	-	145	-	-	-	2900	5	8	145
	01	350	-	-	-	-	-	-	-	-	350	-	-	-	7000	3	4	350

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+26%
'90	00%	00%	00%	+61%
'96	00%	00%	00%	+53%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	933	Dec:	-
	'90	1266		-
	'96	3260		-
	'01	7000		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	84	8	-	-	-	-	-	-	-	-	8	-	-	-	266	4	6	8
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133	4	9	4
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340	5	11	17
	01	27	-	-	1	-	-	-	-	-	28	-	-	-	560	5	12	28
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	33			1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	-55%
'90	00%	00%	20%	+59%
'96	00%	00%	00%	+35%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	366	Dec:	0%
	'90	166		20%
	'96	400		5%
	'01	620		3%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Rosa woodsii																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	25	-	-	-	-	-	-	-	-	25	-	-	-	500			25
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560	16	18	28
	01	3	48	18	-	-	-	-	-	-	69	-	-	-	1380	8	7	69
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+24%
'01	69%	26%	01%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		0%
'90	0			0%
'96	1060			0%
'01	1400			1%

Trend Study 7-4-01

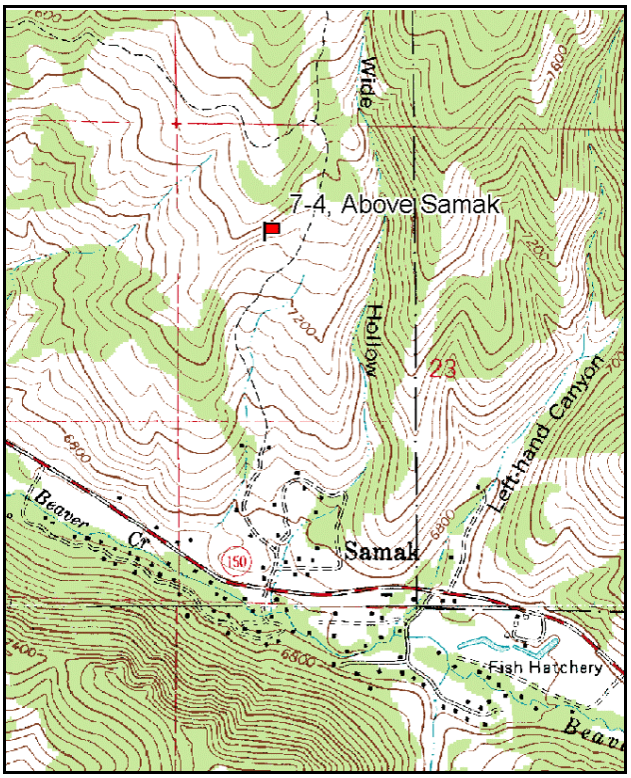
Study site name: Above Samak . Vegetation type: Mountain Brush .

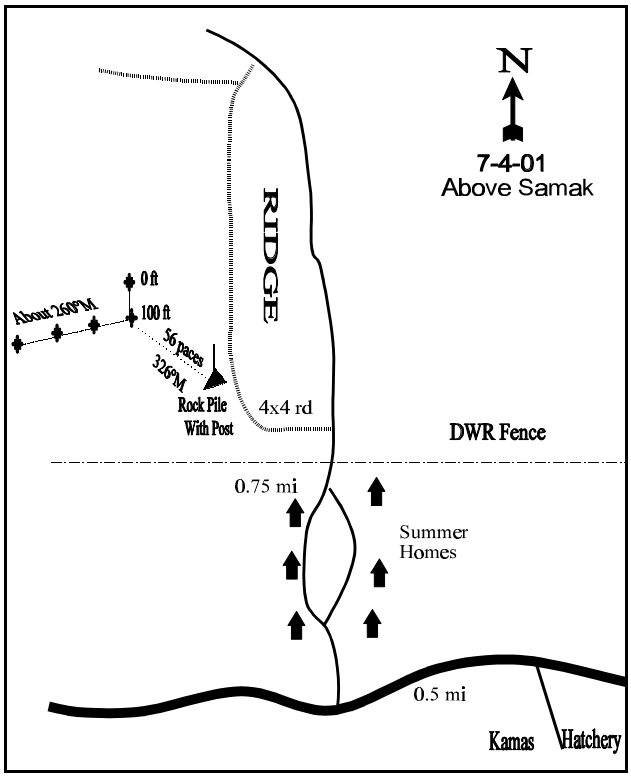
Compass bearing: frequency baseline 180 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (59ft), line 3 (71ft), line 4 (34ft).

LOCATION DESCRIPTION

From the Kamas fish hatchery proceed west 0.5 miles. Turn right onto a dirt road and proceed north. The road will split (go left) around the summer houses and reunite in 0.2 miles. After passing the homes, you will come to a DWR fence and gate. Proceed 0.1 miles past the gate and turn left, proceeding up a very steep hill (4X4 recommended). After reaching the top, proceed north until you see a green steel stake in a rockpile on the left. The rockpile is 0.75 miles from the highway. From the rockpile, walk 56 paces at 326 degrees magnetic to the 100-foot stake of the baseline. The 0-foot stake is marked by browse tag #7959. The rest of the baseline doglegs at the 100-foot baseline stake and runs 260 degrees magnetic.





Map Name: Hoyt Peak Diagrammatic Sketch

Township 2S , Range 6E , Section 22 UTM 4498170 N 479900 E

DISCUSSION

Trend Study No. 7-4

The Above Samak study is located on Division of Wildlife Resources property in Beaver Creek Canyon. The site is at a moderately high elevation (7,200 feet) with a slope of 23%. Exposure is to the southwest. This area can be classified as deer and elk winter range during more mild winters, or transitional spring-fall range during the more harsh winters. The site and surrounding area was burned and seeded in the early-1960's. Domestic livestock also graze the area during the summer. The community was originally dominated by Gambel oak with some mountain brush species and little herbaceous cover. The site is now made up of scattered openings of mountain brush and seeded grasses interspersed with Gambel oak clones. Animal use on the site is quite variable, depending on wintering conditions. There was moderate to heavy use on all browse species during the harsh winter of 1983-84. In 2001, pellet group transect data collected along the study baseline estimated 23 elk days use/acre (56 edu/ha), 31 deer days use/acre (76 ddu/ha), and 9 cow days use/acre (23 cdu/ha).

Soils on the site are very rocky and well-drained with high permeability. Cover from surface rock and pavement is moderately high at around 21%. Percent bare ground was also estimated at about 21% in 2001. Effective rooting depth was estimated at nearly 16 inches in 1996. Soil texture was classified as a clay loam with a neutral soil reaction (6.8 pH). With the high amount of rock in the upper soil profile, the moderately steep slope (23%), and the southwest aspect, this site can get rather dry during the summer. Litter and vegetative cover appears adequate to prevent serious erosion. Some "trailing" and trampling damage associated with livestock use is apparent but not serious. An erosion condition class assessment determined soils to be stable in 2001.

Browse composition consists of a mix of Gambel oak, mountain snowberry, mountain big sagebrush, Saskatoon serviceberry, and several less numerous shrubs. Gambel oak could eventually become the ecologically dominant species with suppression of fire or excessive grazing. Density was estimated at 1,360 stems/acre in 1996, increasing to 3,340 stems/acre in 2001. Oak provided 24% of the total browse cover in 1996, decreasing to 15% in 2001. The oak population has consisted of a preponderance of young plants in the past. In 2001, young plants still make up 38% of the population. Oak clones vary in height throughout the site, with the larger ones being estimated at 12-15 feet. Due to a late frost in this area in June of 2001, many of the oak showed leaf damage and death when the site was sampled in September of 2001. As a result, 18% of the plants sampled were classified with poor vigor.

Other shrub populations appear stable at the present time (‘01). Browse utilization has been heaviest on serviceberry and bitterbrush in the past. Serviceberry density is estimated at just under 300 plants/acre in 1996 and 2001. Decadence has remained steady at around 20% for the last three sampling periods. In 1996 and 2001, mountain big sagebrush provided the largest proportion of the browse cover of any species at 39% and 44% respectively. Density of mountain big sagebrush was estimated at 1,180 plants/acre in 2001. Use on sagebrush was moderate to heavy in 1984, but has been more moderate to light since. In 2001, percent decadence increased from 6% to 17%. Recruitment from young plants is fairly low at only 2% of the population. Mountain snowberry had an estimated density of 1,500 plants/acre in 2001, which provides an additional 29% of the browse cover. In 2001, annual leader growth averaged 1.3 inches for mountain big sagebrush and 2.3 inches for serviceberry.

The composition of the herbaceous understory is dominated by seeded species, primarily grasses. Smooth brome, crested wheatgrass, and intermediate wheatgrass are all very common. These three species contribute to over half of the total herbaceous cover in 1996 and 2001. Crested and intermediate wheatgrass decreased in nested frequency in 2001, although neither was a statistically significant decline from the 1996 frequency

values. Grasses showed evidence of heavy grazing in the past, but currently show only light use. Alfalfa, also a seeded species, is the most abundant forb on the site in terms of cover. Alfalfa showed utilization in 2001. It was characterized as low growing with a sprawling growth form.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable to improving. This area has a very rocky, well-drained soil with good cover from vegetation, litter, and rock. During the period from 1977 to 1984, there appears to have been some improvement in vegetative cover. The apparent erosion rate is minimal. Depending upon location, vegetative trend also appears stable to improving. On previously unburned sites, mature oakbrush prevails over a good grass-forb understory. These burned areas still have developing oak and other browse populations. However, oak is the likely dominant. Grasses and forbs seem relatively stable. Seeded grasses appear especially persistent and should continue to provide the bulk of livestock and early spring big game forage.

1990 TREND ASSESSMENT

The data indicates several changes in the mountain big sagebrush population. There has been a significant decline in sagebrush density (from 2,399 plants/acre to 1,665 plants/acre), there are few seedlings and young, and the amount of hedging is somewhat lighter compared to 1984 levels. The reduced vigor and increased percent decadence is most likely related to moisture stress (extended drought) and competition. Sagebrush cover averages about 9%. Oakbrush has not expanded, although there are a large number of young sprouts. Grass abundance is high due to the presence of seeded grasses. Grass species identification was difficult due to heavy utilization before the study was sampled in mid-September. Total sum of nested frequency for grasses was higher. Frequency and density of alfalfa is unchanged and remains, along with low penstemon, the most common perennial forb. There were slight shifts in the percentage of litter and basal vegetative cover, but the percentage of bare soil remained stable.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down for sagebrush (2)
herbaceous understory - stable (3)

1996 TREND ASSESSMENT

The trend for soil is slightly up with percent bare ground declining to less than 10%, and the nested frequency for grasses and forbs showing substantial increases. As on other sites, the key browse species (mountain big sagebrush) is now stable at a lower density. Vigor has improved and percent decadence is only 6%. Browse trend is stable at this time. The herbaceous understory has improved slightly with increased sum of nested frequency values for both grasses and forbs.

TREND ASSESSMENT
soil - slightly up (4)
browse - stable (3)
herbaceous understory - up slightly (4)

2001 TREND ASSESSMENT

Soil trend is slightly down. Bare ground increased from 10% to 21%, and percent litter cover declined from 45% to 35%. Even with these changes in ground cover parameters, soil erosion is minimal at the present time. Trend for browse is stable. Mountain big sagebrush slightly decreased in density and level of use, but

increased in percent decadence. However, the current level of decadence (17%) is not extreme, while recruitment remains fairly low (2%). The herbaceous understory shows a stable trend. Perennial grasses slightly decreased in sum of nested frequency, conversely perennial forbs have increased in sum of nested frequency in 2001. Seeded species remain dominate on the site, especially smooth brome.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 07 , Study no: 4

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	ab117	a100	b145	ab124	55	45	51	49	5.53	2.86
G	Agropyron dasystachyum	a-	a-	a-	b11	-	-	-	6	-	.27
G	Agropyron intermedium	a55	a47	b103	ab77	28	28	39	28	4.07	1.88
G	Agropyron spicatum	26	20	16	5	10	9	9	3	.46	.04
G	Bromus inermis	243	267	249	266	85	85	78	86	12.64	10.56
G	Bromus japonicus (a)	-	-	-	3	-	-	-	1	-	.03
G	Poa bulbosa	a-	a-	ab3	b9	-	-	1	5	.00	.16
G	Poa fendleriana	a-	b20	a1	a5	-	8	1	2	.00	.18
G	Poa pratensis	-	4	-	-	-	1	-	-	-	-
G	Poa secunda	3	8	7	14	2	4	5	6	.10	.25
G	Stipa lettermani	-	7	-	-	-	3	-	-	-	-
Total for Annual Grasses		0	0	0	3	0	0	0	1	0	0.03
Total for Perennial Grasses		444	473	524	511	180	183	184	185	22.83	16.22
Total for Grasses		444	473	524	514	180	183	184	186	22.83	16.25
F	Achillea millefolium	5	4	1	2	2	3	1	1	.06	.03
F	Agoseris glauca	-	-	-	3	-	-	-	1	-	.00
F	Allium acuminatum	ab10	b18	a6	a-	6	11	3	-	.04	-
F	Alyssum alyssoides (a)	-	-	-	2	-	-	-	1	-	.00
F	Allium spp.	a-	a-	a-	b27	-	-	-	11	-	.10
F	Arabis spp.	-	4	4	9	-	3	3	4	.04	.07
F	Astragalus convallarius	3	2	6	-	1	1	2	-	.06	-
F	Astragalus spp.	a-	a-	a-	b15	-	-	-	9	-	.34
F	Calochortus nuttallii	-	-	-	4	-	-	-	2	-	.01
F	Chaenactis douglasii	-	-	1	-	-	-	1	-	.00	-
F	Cirsium spp.	1	6	-	-	1	2	-	-	-	-
F	Comandra pallida	-	-	-	5	-	-	-	3	-	.07
F	Collinsia parviflora (a)	-	-	a31	b86	-	-	14	31	.14	.33

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Cryptantha spp.	$_{b}$20	$_{a}$-	$_{a}$-	$_{a}$-	8	-	-	-	-	-
F	Epilobium brachycarpum (a)	-	-	-	2	-	-	-	1	-	.00
F	Erigeron pumilus	$_{b}$15	$_{b}$10	$_{b}$15	$_{a}$-	7	5	7	-	.13	-
F	Eriogonum racemosum	-	-	-	7	-	-	-	3	-	.09
F	Machaeranthera canescens	$_{b}$35	$_{a}$6	$_{a}$4	$_{a}$-	17	3	3	-	.04	-
F	Medicago sativa	42	40	55	59	18	19	29	30	2.96	4.21
F	Microsteris gracilis (a)	-	-	$_{a}$-	$_{b}$51	-	-	-	24	-	.22
F	Penstemon humilis	55	55	55	29	23	25	23	14	1.02	.32
F	Petradoria pumila	$_{a}$-	$_{a}$-	$_{b}$25	$_{b}$38	-	-	10	14	1.08	2.44
F	Phlox longifolia	$_{a}$-	$_{ab}$8	$_{ab}$2	$_{b}$9	-	3	1	5	.00	.05
F	Polygonum douglasii (a)	-	-	$_{b}$21	$_{a}$3	-	-	8	1	.04	.00
F	Ranunculus testiculatus (a)	-	-	$_{a}$21	$_{b}$94	-	-	9	32	.07	1.78
F	Senecio integerrimus	$_{a}$-	$_{a}$2	$_{a}$-	$_{b}$12	-	1	-	6	-	.08
F	Veronica biloba (a)	-	-	117	116	-	-	47	40	.46	.50
F	Verbascum thapsus	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$28	-	-	-	9	-	.48
F	Zigadenus paniculatus	-	2	4	4	-	2	4	2	.09	.06
Total for Annual Forbs		0	0	190	354	0	0	78	130	0.72	2.84
Total for Perennial Forbs		186	157	178	251	83	78	87	114	5.55	8.38
Total for Forbs		186	157	368	605	83	78	165	244	6.27	11.23

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 4

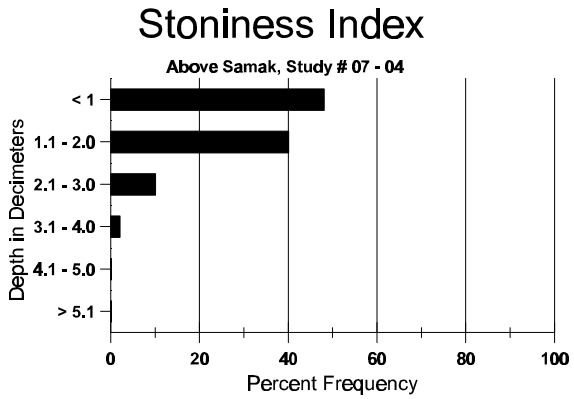
Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	13	12	1.27	1.42
B	Artemisia tridentata vaseyana	39	38	6.27	8.01
B	Chrysothamnus depressus	0	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	3	7	.12	.06
B	Mahonia repens	34	35	.90	.21
B	Opuntia spp.	0	0	-	-
B	Purshia tridentata	1	2	.03	.48
B	Quercus gambelii	19	21	3.82	2.72
B	Symphoricarpos oreophilus	29	36	3.82	5.22
Total for Browse		138	152	16.25	18.13

BASIC COVER --
Herd unit 07 , Study no: 4

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	366	360	5.00	11.00	44.96	44.24
Rock	254	225	12.50	13.25	16.81	15.30
Pavement	177	239	9.25	15.00	3.97	5.63
Litter	393	371	54.75	40.50	45.09	35.33
Cryptogams	38	12	0	.75	.66	.33
Bare Ground	221	262	18.50	19.50	9.90	21.62

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 04, Above Samak

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.6	N/A (N/A)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 4

Type	Quadrat Frequency	
	'96	'01
Rabbit	-	1
Elk	8	17
Deer	12	8
Cattle	3	4

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
01	01
17	N/A
296	23 (56)
400	31 (76)
113	9 (23)

BROWSE CHARACTERISTICS --
Herd unit 07 , Study no: 4

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	2	-	-	2	-	-	-	133			2
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	1	5	-	-	-	-	-	-	6	-	-	-	400	40	37	6
	90	-	-	2	-	-	-	-	-	-	2	-	-	-	133	34	30	2
	96	1	-	7	1	1	1	-	-	-	11	-	-	-	220	31	43	11
	01	-	2	2	1	1	4	-	-	-	10	-	-	-	200	29	33	10
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	2	-	1	-	-	-	-	2	-	-	1	60			3
	01	-	2	-	-	1	-	-	-	-	2	-	-	1	60			3
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	29%	71%	00%	-29%
'90	20%	60%	00%	-16%
'96	14%	71%	07%	- 7%
'01	46%	46%	08%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	466	Dec:	0%
'90	332		20%
'96	280		21%
'01	260		23%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	84	-	10	-	-	-	-	-	-	-	10	-	-	-	666			10
	90	-	1	-	1	-	-	-	-	-	2	-	-	-	133			2
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	10	11	-	-	-	-	-	-	21	-	-	-	1400	20	29	21
	90	6	10	-	-	-	-	-	-	-	13	1	2	-	1066	19	23	16
	96	19	36	4	-	-	-	-	-	-	59	-	-	-	1180	21	35	59
	01	22	19	6	1	-	-	-	-	-	48	-	-	-	960	25	34	48
D	84	-	2	3	-	-	-	-	-	-	5	-	-	-	333			5
	90	3	2	2	-	-	-	-	-	-	6	-	-	1	466			7
	96	-	4	-	-	-	-	-	-	-	4	-	-	-	80			4
	01	3	5	2	-	-	-	-	-	-	5	1	2	2	200			10
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	280			14
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	200			10

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	61%	39%	00%	-31%
'90	52%	08%	12%	-21%
'96	61%	06%	00%	-11%
'01	41%	14%	07%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'84	2399	Dec:		14%
	'90	1665			28%
	'96	1320			6%
	'01	1180			17%

Chrysothamnus depressus																		
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	0%
	'90	0		0%
	'96	0		0%
	'01	20		100%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	12	17	3
	01	9	-	-	-	-	-	-	-	-	9	-	-	-	180	10	12	9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+67%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	60		-
	'01	180		-

Mahonia repens																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	59	-	-	3	-	-	1	-	-	63	-	-	-	4200			63
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	01	16	-	-	-	-	-	-	-	-	16	-	-	-	320			16
M	84	237	-	-	-	-	-	-	-	-	237	-	-	-	15800	4	6	237
	90	5	-	-	6	-	-	1	-	-	12	-	-	-	800	4	5	12
	96	139	-	-	-	-	-	-	-	-	139	-	-	-	2780	3	5	139
	01	186	-	-	42	-	-	-	-	-	228	-	-	-	4560	3	3	228

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	-68%
'90	00%	00%	00%	-42%
'96	00%	00%	00%	+41%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	15800	Dec:	-
	'90	5000		-
	'96	2880		-
	'01	4880		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	8	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	0		-
	'01	0		-

Purshia tridentata																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20	11	41	1
	01	-	1	-	1	-	-	-	-	-	2	-	-	-	40	19	68	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	100%	00%	+50%
'01	50%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	20		-
	'01	40		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Quercus gambelii																		
S	84	46	-	-	-	-	-	-	-	-	46	-	-	-	3066			46
	90	47	2	-	11	-	-	3	-	-	59	2	2	-	4200			63
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	32	118	-	-	-	-	-	-	-	150	-	-	-	10000			150
	90	90	13	-	23	-	-	-	-	-	115	11	-	-	8400			126
	96	29	6	-	-	-	-	-	-	-	35	-	-	-	700			35
	01	50	-	-	14	-	-	-	-	-	64	-	-	-	1280			64
M	84	-	23	16	-	-	-	-	-	-	39	-	-	-	2600	47	37	39
	90	2	9	-	2	-	-	-	-	-	13	-	-	-	866	58	29	13
	96	21	10	-	-	-	-	-	-	-	31	-	-	-	620	31	25	31
	01	69	-	-	-	-	-	-	12	-	64	-	17	-	1620	51	20	81
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	19	3	-	1	-	-	-	-	-	17	1	3	2	1533			23
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	19	-	-	3	-	-	-	-	-	9	-	10	3	440			22
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	200			10
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	420			21

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	75%	08%	00%	-14%
'90	15%	00%	03%	-87%
'96	24%	00%	00%	+59%
'01	00%	00%	18%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'84	12600		0%
	'90	10799		14%
	'96	1360		3%
	'01	3340		13%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	2	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	84	-	14	-	-	-	-	-	-	-	14	-	-	-	933	18	29	14
	90	3	4	2	11	-	-	-	-	-	17	-	3	-	1333	14	15	20
	96	17	21	1	7	-	-	-	-	-	46	-	-	-	920	16	31	46
	01	60	-	-	6	-	-	-	-	-	62	4	-	-	1320	15	28	66
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	3	2	-	3	-	-	-	-	-	1	-	3	4	533			8
	96	-	2	6	-	-	-	-	-	-	4	-	-	4	160			8
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	100%	00%	00%	+47%
'90	20%	07%	33%	-40%
'96	38%	12%	07%	+20%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	1066	Dec:	0%
	'90	1999		27%
	'96	1200		13%
	'01	1500		3%

Tetradymia canescens

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	20	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	0		-
	'01	0		-

Trend Study 7-6-01

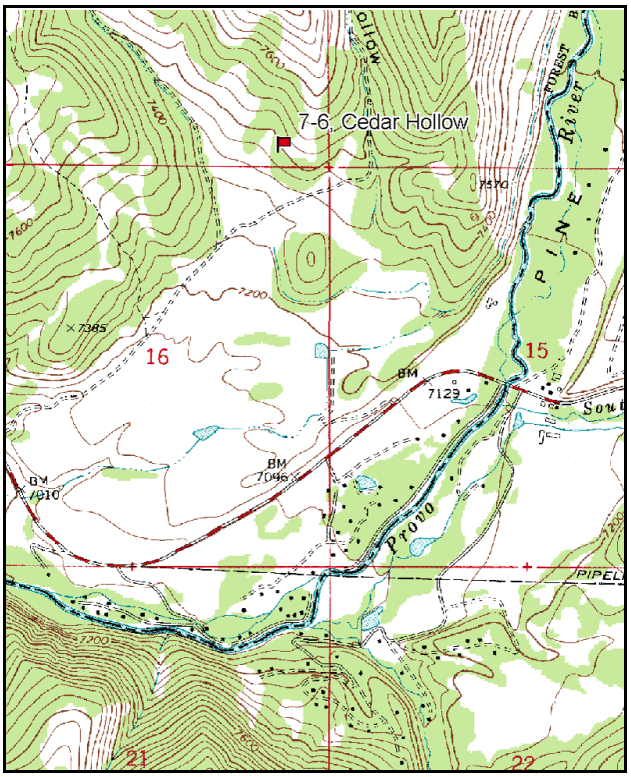
Study site name: Cedar Hollow . Vegetation type: Mountain Brush .

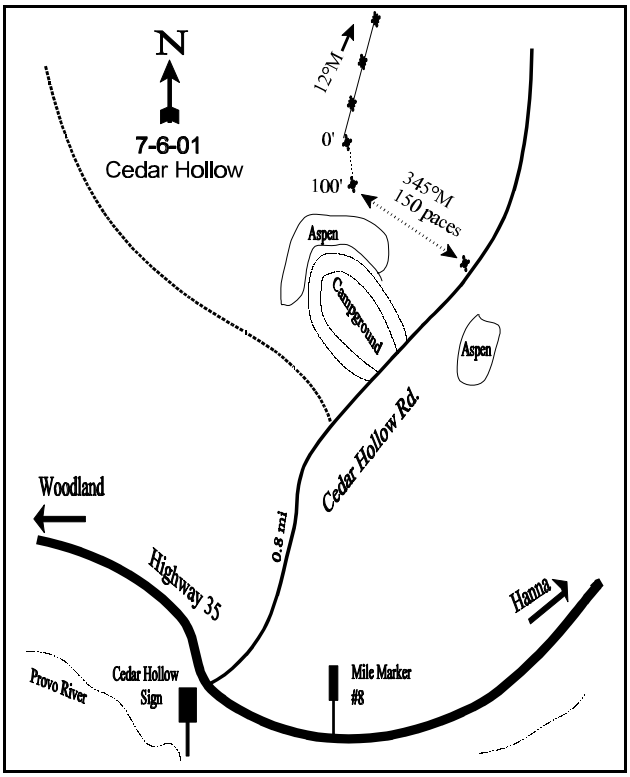
Compass bearing: frequency baseline 166 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (71ft), line 3 (59ft), line 4 (34ft).

LOCATION DESCRIPTION

Eastbound on Highway 35 from Woodland, turn left (north) at the Cedar Hollow sign. If you pass mile-marker 8 you have gone too far. Travel 0.8 miles on the main dirt road passing two left turns, and stop next to a small witness post on the left side of the road. There is a small stand of aspen on the right. From the witness post walk at a bearing of 345 degrees magnetic for 150 paces to the 0-foot baseline stake. The 0-foot stake is marked by browse tag #416.





Map Name: Woodland

Diagrammatic Sketch

Township 3S , Range 7E , Section 16

UTM 4490451 N 487453 E

DISCUSSION

Trend Study No. 7-6

The Cedar Hollow study is located near the top end of normal winter range. This study lies at an elevation of approximately 7,400 feet on a moderately steep (15%), south-facing exposure. Because of the moderately high elevation, this area probably does not constitute critical range, more likely it acts as transitional spring-fall range for big game. There are generally few signs of heavy or excessive big game use on browse, except for bitterbrush and serviceberry because of their relatively low populations. The vegetative make up of the area consists of varying sized clumps of serviceberry, moderately tall Gambel oakbrush clones, and quaking aspen intermixed with more open areas dominated by mountain big sagebrush-grass and mountain snowberry. Pellet groups of deer, elk, and moose are present, yet none are very abundant. Cattle also graze the area. A pellet group transect read along the vegetation baseline in 2001 estimated 5 elk days use/acre (12 edu/ha), 20 deer days use/acre (50 ddu/ha), and 1 moose day use/acre (2 mdu/ha).

Soils appear to be moderately deep and well-drained. Effective rooting depth (refer to methods) was estimated at almost 11 inches in 1996. Soil texture is classified as a clay loam with a neutral soil reaction (7.0 pH). Surface rock is of varying size and covers an estimated 21% of the soil surface (pavement included). Parent material is sandstone and limestone. This area probably receives at least 20 inches of annual precipitation and thus has a fairly extensive vegetative cover. However, there are interspaces where the soil appears compacted where noticeable sheet and gully erosion has occurred. Overall soil condition is fair to good. An erosion condition class assessment determined stable soils on the site in 2001.

Vegetatively, the site is similar to that of other transitional ranges described earlier. Gambel oak occurs frequently in the study area but consists of clumps of mature plants that are partially unavailable because of their height. Oak probably has an ecological influence in the area greater than the data summary might indicate. The most important species based on abundance, cover, and relative palatability is mountain big sagebrush. Mountain big sagebrush density is estimated at about 1,800 plants/acre in 1996 and 2001. The sagebrush population had a very high incidence of decadent plants in 1984 at 75%. Percent decadence has been much lower since 1984, with current (‘01) estimates at 29%. The proportion of the population showing poor vigor has been moderate in all years except 1996. Use was moderate to heavy on sagebrush in 1984, but has since declined to a level that is light to moderate. In past reports, it was noted that the sagebrush population on this site may be showing similar characteristics of other sagebrush communities where moderately high densities and prolonged drought had caused increased decadence and reduced vigor due to high intraspecific competition. These strongly competitive conditions would be moderated during periods of normal precipitation. Another plausible explanation for high decadence and reduced vigor on sagebrush at this elevation is winter injury. Annual leader growth on sagebrush averaged just under 2 inches in 2001.

Serviceberry and bitterbrush provide additional preferred forage, but they occur in low densities at an estimated 600 and 380 plants/acre in 2001 respectively. Both species show moderate to heavy use. Average annual leader growth was estimated at 2 inches for bitterbrush and 1.8 inches for serviceberry during the 2001 sample. Gambel oak occurs in scattered clones throughout the area, but this species is not extensively sampled by this particular study. Oak density was estimated at 900 stems/acre in 2001, and the entire population was classified as having poor vigor. Reduced vigor in the population of Gambel oak occurred because of a late snow storm and cold temperatures in June 2001. The resultant cold temperatures caused widespread meristematic and leaf death on oak, including this particular study.

This site only has a fair herbaceous understory component. Grasses are more productive than forbs, providing 33% of the total vegetation cover in 2001. Forbs provide 11% of the vegetation cover in 2001, with most coming from perennial species. Grasses are diverse on the site, which include several aggressive increasers

which provide an effective ground cover and an important source of livestock forage. A Carex, bulbous bluegrass, mutton bluegrass, and bluebunch wheatgrass are the most abundant grasses. Utilization on grasses was light to moderate in 1996, with no utilization apparent in 2001.

1984 APPARENT TREND ASSESSMENT

Almost all of the data and apparent trend parameters suggest a stable or even improving soil trend. Although some bare interspaces persist, they are not serious erosion sources and may in fact be stabilizing. Vegetative trend is more complex, but is also basically stable. The fate of mountain big sagebrush is unclear although there are a few indications of a declining population. Sagebrush density has remained relatively stable, but a decadent age structure may indicate a future change. Grass abundance and production is at least stable and may be increasing. In the future, it will be important to closely observe species such as Kentucky bluegrass and bulbous bluegrass. These increasers will be the most likely to benefit from a decline in big sagebrush or increased livestock grazing.

1990 TREND ASSESSMENT

Browse composition is basically unchanged. The oakbrush, although it has not greatly expanded, appears to be more productive and have a greater influence in 1990. Mountain big sagebrush shows a slightly lower density, which is not surprising based on the highly decadent population (75%) encountered during the initial sampling. Young shrubs have replaced some of the decadent plants, but overall density is down. Vigor is less than optimum on half of the sagebrush even though there has been only light to moderate utilization the last several years. Sagebrush cover averages about 10%. Serviceberry has increased in density. The 1990 data shows an increase in grass frequency and number of species encountered. A larger number of forb species were identified, surprising for late in a dry year. A slightly higher percent cover for rock and pavement was recorded in 1990. Vegetative and litter cover are adequate to minimize soil movement.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

1996 TREND ASSESSMENT

The trend for soil is stable with slightly lower amounts of rock/pavement cover and bare ground. The browse trend is still considered stable. The increased density of mountain big sagebrush is primarily a function of the larger sampling design that picked up more plants. Mountain big sagebrush currently makes up 40% of the browse cover, has improved vigor, and a significantly lower percent decadence in the population. Bitterbrush and mountain snowberry are also in good health. The herbaceous understory is considered stable. Perennial grasses maintained stable sum of nested frequency values, while forbs declined in sum of nested frequency. However, grasses provide more than six times the amount of cover as forbs, so trend is considered stable.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Soils have a stable trend. Bare ground slightly increased, but vegetation cover also increased. Trend for browse is stable. Mountain big sagebrush shows a stable density with use remaining light to moderate. Decadence is moderate at 29%, but much lower than that reported in 1984 and 1990. Sum of nested frequency increased for both perennial grasses and perennial forbs. Trend is considered slightly up overall.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --
Herd unit 07 , Study no: 6

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	-	-	-	2	-	-	-	1	-	.00
G	Agropyron spicatum	$_{b}$152	$_{b}$151	$_{ab}$145	$_{a}$107	60	55	55	43	2.03	2.06
G	Bromus carinatus	$_{a}$-	$_{a}$6	$_{a}$-	$_{b}$23	-	2	-	9	-	.20
G	Bromus inermis	-	12	-	-	-	4	-	-	-	-
G	Bromus tectorum (a)	-	-	1	-	-	-	1	-	.00	-
G	Carex spp.	73	92	68	78	22	29	26	26	4.08	4.29
G	Festuca spp.	-	-	3	-	-	-	1	-	.00	-
G	Koeleria cristata	-	-	-	2	-	-	-	1	-	.03
G	Melica bulbosa	-	-	3	1	-	-	1	1	.00	.03
G	Poa bulbosa	$_{a}$-	$_{b}$79	$_{b}$107	$_{c}$199	-	37	35	67	3.57	4.99
G	Poa fendleriana	$_{a}$97	$_{ab}$130	$_{ab}$105	$_{b}$140	41	53	41	53	1.47	2.79
G	Poa pratensis	$_{a}$46	$_{b}$83	$_{b}$107	$_{a}$48	18	31	37	21	2.80	.81
G	Poa secunda	$_{ab}$31	$_{a}$19	$_{b}$56	$_{a}$23	16	11	25	8	.71	.33
G	Stipa columbiana	$_{ab}$9	$_{b}$28	$_{a}$9	$_{a}$7	5	12	4	3	.09	.21
Total for Annual Grasses		0	0	1	0	0	0	1	0	0.00	0
Total for Perennial Grasses		408	600	603	630	162	234	225	233	14.79	15.77
Total for Grasses		408	600	604	630	162	234	226	233	14.80	15.77
F	Agoseris glauca	-	4	-	4	-	2	-	2	-	.01
F	Allium spp.	$_{a}$-	$_{a}$-	$_{a}$5	$_{b}$24	-	-	3	10	.01	.10
F	Aster chilensis	$_{b}$105	$_{b}$121	$_{a}$48	$_{a}$35	39	48	21	14	.47	.44
F	Astragalus spp.	$_{a}$-	$_{a}$-	$_{a}$2	$_{b}$65	-	-	2	30	.01	.84
F	Balsamorhiza sagittata	7	16	11	14	5	10	6	9	.54	1.64
F	Castilleja linariaefolia	3	1	6	6	1	1	3	3	.04	.21
F	Calochortus nuttallii	-	2	3	4	-	1	1	2	.00	.01
F	Cirsium undulatum	14	17	8	8	8	10	4	4	.07	.09

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Collomia linearis (a)	-	-	$_{a}$12	$_{b}$39	-	-	4	18	.02	.16
F	Comandra pallida	80	83	58	69	35	33	23	27	.29	.78
F	Collinsia parviflora (a)	-	-	-	8	-	-	-	4	-	.02
F	Crepis acuminata	-	1	3	-	-	1	1	-	.00	-
F	Epilobium brachycarpum (a)	-	-	$_{a}$-	$_{b}$26	-	-	-	11	-	.05
F	Eriogonum racemosum	$_{a}$1	$_{ab}$8	$_{b}$12	$_{ab}$7	1	4	7	4	.16	.04
F	Eriogonum umbellatum	-	4	-	6	-	3	-	3	-	.21
F	Hackelia patens	$_{b}$10	$_{a}$-	$_{a}$-	$_{a}$-	5	-	-	-	-	-
F	Holosteum umbellatum (a)	-	-	2	2	-	-	1	1	.00	.00
F	Ligusticum spp.	-	5	-	-	-	2	-	-	-	-
F	Lupinus argenteus	-	8	-	7	-	3	-	4	.03	.21
F	Machaeranthera canescens	$_{b}$30	$_{a}$6	$_{a}$-	$_{a}$-	11	3	-	-	-	-
F	Microsteris gracilis (a)	-	-	$_{a}$-	$_{b}$7	-	-	-	5	.00	.02
F	Penstemon leonardi	$_{a}$-	$_{b}$17	$_{b}$26	$_{b}$18	-	9	12	9	.65	.34
F	Phlox longifolia	$_{a}$-	$_{c}$32	$_{b}$15	$_{ab}$10	-	17	9	4	.04	.05
F	Polygonum douglasii (a)	-	-	8	-	-	-	3	-	.01	-
F	Senecio integerrimus	$_{a}$-	$_{a}$1	$_{a}$7	$_{b}$21	-	1	4	12	.07	.18
F	Solidago spp.	$_{b}$41	$_{a}$-	$_{a}$-	$_{a}$-	19	-	-	-	-	-
F	Streptanthus cordatus	1	2	-	3	1	1	-	1	-	.00
F	Tragopogon dubius	$_{a}$-	$_{a}$-	$_{a}$1	$_{b}$7	-	-	1	3	.00	.01
F	Zigadenus paniculatus	-	3	-	3	-	1	-	1	-	.00
Total for Annual Forbs		0	0	22	82	0	0	8	39	0.04	0.27
Total for Perennial Forbs		292	331	205	311	125	150	97	142	2.42	5.23
Total for Forbs		292	331	227	393	125	150	105	181	2.47	5.50

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 6

Type	Species	Strip Frequency '96	Strip Frequency '01	Average Cover % '96	Average Cover % '01
B	Amelanchier alnifolia	19	20	.22	.87
B	Artemisia tridentata vaseyana	59	58	8.10	8.01
B	Ceanothus velutinus	2	2	-	.15
B	Chrysothamnus depressus	0	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	51	53	1.85	1.98
B	Eriogonum heracleoides	0	4	-	.06
B	Eriogonum microthecum	17	0	.22	-
B	Mahonia repens	65	60	1.16	2.63
B	Opuntia spp.	3	3	.03	-
B	Pachistima myrsinites	4	0	.03	-
B	Purshia tridentata	15	16	2.93	3.94
B	Quercus gambelii	3	5	1.25	1.63
B	Symphoricarpos oreophilus	67	65	4.55	7.30
Total for Browse		305	287	20.35	26.61

CANOPY COVER --
Herd unit 07 , Study no: 6

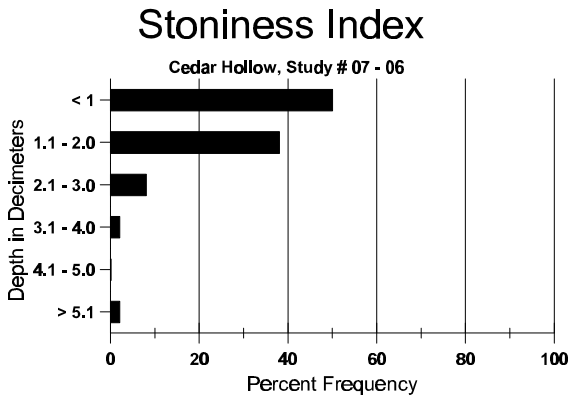
Species	Percent Cover '96	Percent Cover '01
Quercus gambelii	3	3

BASIC COVER --
Herd unit 07 , Study no: 6

Cover Type	Nested Frequency '96	Nested Frequency '01	Average Cover % '84	Average Cover % '90	Average Cover % '96	Average Cover % '01
Vegetation	350	366	3.75	16.50	39.31	51.52
Rock	265	223	12.00	12.25	15.11	14.48
Pavement	213	221	7.00	11.75	4.56	7.09
Litter	384	366	60.00	46.75	42.47	35.27
Cryptogams	28	9	.25	0	.53	.21
Bare Ground	235	262	17.00	12.75	11.13	17.47

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 06, Cedar Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
10.6	53.8 (14.5)	7.0	40.2	30.4	29.4	4.9	11.5	166.4	.6



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 6

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	01	01
Moose	-	2	17	1 (2)
Elk	5	-	61	5 (12)
Deer	7	11	261	20 (50)
Cattle	1	2	-	-
Rabbit	-	-	17	N/A

BROWSE CHARACTERISTICS --
Herd unit 07 , Study no: 6

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	2	-	-	1	-	-	5	-	-	-	333			5
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	3	1	1	1	-	-	3	-	-	7	-	2	-	600			9
	96	-	2	-	3	-	-	-	-	-	4	1	-	-	100			5
	01	11	1	-	-	-	-	-	-	-	12	-	-	-	240			12
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	1	1	-	-	-	66	89	71	1
	96	1	8	1	2	-	-	-	-	-	6	4	2	-	240	30	32	12
	01	2	-	2	1	2	-	-	-	-	6	-	1	-	140	43	31	7
D	84	-	-	-	-	-	1	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	96	-	2	-	-	-	-	-	-	-	1	1	-	-	40			2
	01	3	2	-	-	-	6	-	-	-	7	1	2	1	220			11

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	100%	00%	+91%
'90	09%	18%	18%	-48%
'96	63%	05%	11%	+37%
'01	17%	27%	13%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	66	Dec:	100%
	'90	732		9%
	'96	380		11%
	'01	600		37%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	1	-	-	-	2	-	-	133			2
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	3	2	-	-	-	-	-	-	5	-	-	-	333	23	35	5
	90	3	3	-	1	-	-	1	-	-	4	3	-	1	533	26	28	8
	96	50	19	-	1	-	-	-	-	-	69	-	1	-	1400	21	33	70
	01	46	11	6	1	-	-	-	-	-	61	-	3	-	1280	25	37	64
D	84	-	6	9	-	-	-	-	-	-	12	-	2	1	1000			15
	90	5	2	-	-	-	-	-	-	-	5	-	-	2	466			7
	96	6	11	1	-	-	-	-	-	-	14	-	-	4	360			18
	01	16	7	3	-	-	-	-	-	-	13	1	8	4	520			26
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	700			35
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	320			16

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	45%	55%	15%	-15%
'90	29%	00%	18%	+38%
'96	33%	01%	05%	- 1%
'01	20%	10%	17%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	1333	Dec:	75%
	'90	1132		41%
	'96	1820		20%
	'01	1800		29%

Ceanothus velutinus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	2	-	-	-	-	-	2	-	-	-	40	24	90	2
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80	19	50	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+50%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	40		-
	'01	80		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus depressus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	0		-
	'01	20		-

Chrysothamnus viscidiflorus viscidiflorus																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	4	1	-	-	-	-	1	-	-	5	-	1	-	400	12	9	6
	96	89	1	-	9	-	-	-	-	-	99	-	-	-	1980	12	16	99
	01	81	3	-	3	-	-	-	-	-	86	1	-	-	1740	10	16	87
D	84	1	2	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	4	-	-	1	-	-	-	-	-	2	-	-	3	333			5
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	67%	00%	00%	+75%
'90	08%	00%	33%	+62%
'96	.94%	00%	00%	- 7%
'01	03%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	200	Dec:	100%
	'90	799		42%
	'96	2120		0%
	'01	1980		10%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Eriogonum heracleoides																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	2	-	-	2	-	-	-	-	-	4	-	-	-	80	10	10	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	0		-
	'01	80		-

Eriogonum microthecum																		
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	6	1	-	-	-	-	-	-	-	7	-	-	-	466	5	6	7
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	15	-	-	2	-	-	-	-	-	17	-	-	-	340	7	12	17
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	10%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	666	Dec:	-
	'90	0		-
	'96	360		-
	'01	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Mahonia repens																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	50	-	-	3	-	-	-	-	-	53	-	-	-	3533			53
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	296	-	-	-	-	-	-	-	-	296	-	-	-	19733			296
	90	368	-	-	107	-	-	28	-	-	503	-	-	-	33533			503
	96	105	-	-	21	-	-	-	-	-	126	-	-	-	2520			126
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	13	-	-	-	-	-	-	-	-	13	-	-	-	866	6	4	13
	90	271	1	-	78	-	-	74	-	-	424	-	-	-	28266	6	4	424
	96	323	-	-	34	-	-	-	-	-	357	-	-	-	7140	4	6	357
	01	696	-	-	15	-	-	-	-	-	711	-	-	-	14220	4	5	711
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+67%
'90	.10%	00%	00%	-84%
'96	00%	00%	00%	+32%
'01	00%	00%	.14%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	20599	Dec:		0%
'90	61799			0%
'96	9660			0%
'01	14260			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	11	3
	01	1	-	-	7	-	-	-	-	-	8	-	-	-	160	4	10	8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+67%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		-
'90	0			-
'96	60			-
'01	180			-

Pachistima myrsinites																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	3	-	-	-	-	-	4	-	-	-	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	12	36	6
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'84	0	Dec:	-
'90	0		-
'96	200		-
'01	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	4	9	2	-	-	-	-	-	-	15	-	-	-	300	15	60	15
	01	9	2	5	1	-	1	-	-	-	18	-	-	-	360	16	70	18
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	56%	13%	00%	+16%
'01	11%	32%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		0%
'90	0			0%
'96	320			0%
'01	380			5%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Quercus gambelii																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	2	-	-	2	-	-	5	-	-	-	333			5
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	90	3	1	-	8	-	-	4	-	-	16	-	-	-	1066			16
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	1	-	1	-	2	-	-	-	133	67	57	2
	90	17	-	-	-	-	-	-	2	-	19	-	-	-	1266	72	23	19
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	77	98	3
	01	7	-	4	34	-	-	-	-	-	-	-	45	-	900	-	-	45
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	14%	00%	+81%
'90	03%	00%	00%	-98%
'96	00%	00%	00%	+93%
'01	00%	09%	100%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	466	Dec:	0%
'90	2465		5%
'96	60		0%
'01	900		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Rosa woodsii																		
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	-	-	-	2	-	-	-	-	-	2	-	-	-	133			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	2	-	-	-	-	-	-	1	-	1	-	133	25	5	2
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133	18	7	2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	40%	20%	-20%
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	333	Dec:		-
'90	266			-
'96	0			-
'01	0			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	7	-	-	-	-	-	1	-	-	8	-	-	-	533			8
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	11	9	1	-	-	-	-	-	-	20	-	1	-	1400			21
	90	15	8	-	10	-	-	-	-	-	30	-	3	-	2200			33
	96	17	-	-	1	-	-	-	-	-	18	-	-	-	360			18
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	12	5	1	-	-	-	-	-	-	18	-	-	-	1200	23	36	18
	90	13	22	-	25	-	-	8	-	-	53	1	14	-	4533	18	24	68
	96	98	3	-	10	-	-	-	-	-	106	-	5	-	2220	17	28	111
	01	90	4	-	7	1	-	-	-	-	98	4	-	-	2040	16	28	102
D	84	2	3	-	-	-	-	-	-	-	4	-	1	-	333			5
	90	2	3	1	-	-	-	-	-	-	4	-	-	2	400			6
	96	3	-	-	-	-	-	-	-	-	2	-	-	1	60			3
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	39%	05%	05%	+59%
'90	31%	.93%	18%	-63%
'96	02%	00%	05%	-20%
'01	05%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	2933	Dec:	11%	
'90	7133		6%	
'96	2640		2%	
'01	2100		3%	

Trend Study 7-7-01

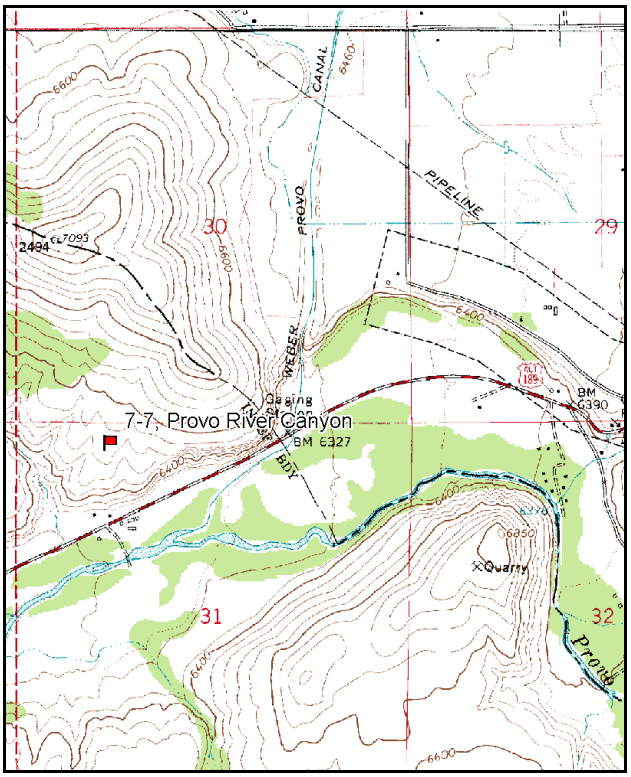
Study site name: Provo River Canyon . Vegetation type: Big Sagebrush-Grass .

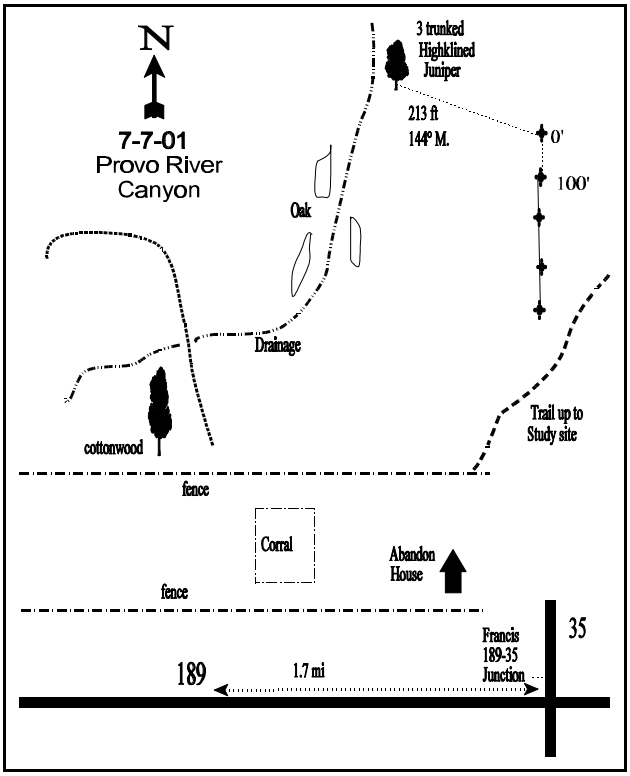
Compass bearing: frequency baseline 160 degrees.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the 189/35 junction in Francis, proceed west on 189 for 1.7 miles and stop at an old corral in a marshy pasture on the right (north). Walk to the large, narrow-leaf cottonwood northwest of the corral. The tree is at the mouth of a small canyon. Walk up the canyon approximately 500 feet until reaching the first drainage on the right. A drainage begins where the road crosses the creek for the second time. Walk up this drainage past the oak clumps to a point where the gully flattens out. To the right locate a 3-trunked, high-lined juniper. From the juniper, walk 213 feet at 144 degrees magnetic to the 0-foot stake of the baseline, marked with browse tag #7960. The baseline runs in a direction of 160 degrees magnetic.





Map Name: Francis

Diagrammatic Sketch

Township 2S , Range 6E , Section 31

UTM 4495230 N 473439 E

DISCUSSION

Trend Study No. 7-7

The Provo River Canyon site samples a narrow band of critical deer winter range located north of the Provo River and west of Francis. The physiography of this study area is characterized by steep, sometimes sheer bluffs bordering the Provo river valley. The principal winter range lies on gentle rolling terrain above the bluffs. Apart from isolated patches of Gambel oak and mixed mountain brush, the remaining area is occupied by the big sagebrush/grass type with scattered individuals of bitterbrush. Most of the area has a southern aspect. The study is on a nearly flat ridge (5% slope) with an elevation of approximately 6,700 feet.

Judging from frequency of pellet groups and the level of forage utilization, use by grazing and browsing animals is light to moderate. Cattle and sheep alternately use the area in the spring-fall period, but obtain little benefit because of the shortage of herbaceous forage. Winter big game use includes elk and mostly deer. In 1996, pellet group quadrat frequency was only 2% for elk and 30% for deer. During the 2001 reading, deer pellet group quadrat frequency remained similar at 26%. A pellet group transect read on site in 2001 estimated 35 deer and 3 elk days use/acre (86 ddu/ha and 7 edu/ha). Rabbit pellets were abundant. Deer pellet groups were primarily from winter use but some groups were recent indicating a few resident deer use the area during the spring and summer.

Soil at the site is relatively deep with an effective rooting depth of almost 15 inches. It has a clay loam texture with a neutral soil reaction (6.6 pH). Vegetation, litter, and cryptogamic cover are high leaving little unprotected bare ground. Where limited erosion has occurred in the past, it is now stabilized and the erosion condition class was determined to be stable in 2001.

The site supports a dense stand of mountain big sagebrush (*Artemisia tridentata vaseyana*) which displays some characteristics of basin big sagebrush (*Artemisia tridentata tridentata*). Mature plants are tall averaging 3 feet in height with a crown of nearly 4 feet. Population density was estimated at over 4,000 plants/acre in 1996 and 2001. Average cover of sagebrush is over 30% which limits herbaceous understory production. Utilization of sagebrush was moderate to heavy in 1984 and 1990, but light to moderate in 1996 and 2001. Percent decadence was high in 1990 at 57% with one-third of the plants sampled expressing poor vigor. Percent decadence declined and poor vigor improved in 1996, which was a wetter year than 1990. Precipitation was again low in 2001, as percent decadence rose from 20% in 1996 to 37%. Twenty-two percent the sagebrush were classified with poor vigor. Both conditions obviously caused by drought combined with intense interspecific competition. This area would benefit from some sagebrush thinning.

The most preferred browse is antelope bitterbrush. It tends to be heavily hedged and somewhat decadent because of its relatively low density compared to all other browse species. This is an area where antelope bitterbrush comprises, on average, only about 5% of the shrub cover. In the past, bitterbrush would have been much more numerous. The population has been lost, mostly because of competition with sagebrush combined with heavy use and being on a southern aspect. Density of bitterbrush was estimated at 866 plants/acre in 1984, declining steadily to 180 plants/acre in 1996. Only 240 plants/acre were estimated in 2001. The population was mostly decadent in 1984 and 1990. It appears that all of the decadent plants have died off and no decadent plants were sampled in 2001. Recruitment is poor with no seedlings or young plants encountered in 1996 or 2001. The only other browse species found on the site include a few serviceberry, stickyleaf low rabbitbrush, and pricklypear cactus.

The herbaceous understory is poor for this high of a site with grasses and forbs combining to produce only 15% cover in 1996 and 17% in 2001. Perennial grasses are represented by bluebunch wheatgrass, Sandberg bluegrass, bottlebrush squirreltail, and small amounts of crested wheatgrass and Great basin wildrye.

Cheatgrass, an annual, was abundant in 1996, when it accounted for over half of the grass cover. Due to the dry conditions of 2001, cheatgrass has declined significantly in nested frequency and cover has dropped from 8% to 2%. Forbs are diverse but few species are abundant. Perhaps due to the decline in cheatgrass, annual and perennial forbs have increased in sum of nested frequency and cover in 2001. Most notable is silky milkvetch which was not sampled in 1996 but in 2001, it provided 56% of the forb cover. The only other common perennial forb consists of small numbers of silvery lupine and longleaf phlox. Several small annual forbs are abundant and include slenderleaf collomia, blue-eyed Mary, owlclover, and pale alyssum.

1984 APPARENT TREND ASSESSMENT

Soil and vegetative trends both appear stable but at a rather low condition rating. Understory composition and production are generally lacking, but have not obviously declined further since 1977 studies. Moreover, soil condition has not greatly changed over such a short period. The poor potential sites are unlikely to improve over any short period of time, while the better, deeper soil sites could erode if shrub cover were to be seriously depleted. However, the potential for that occurring are not serious.

1990 TREND ASSESSMENT

The slopes above Provo River support extensive stands of dense sagebrush. The site has a southwest exposure. There is a consistent 32% canopy cover for sagebrush. The moderately hedged hybrid sagebrush are relatively tall, nevertheless still identified as *Artemisia tridentata vaseyana*. Since 1984, density has decreased slightly and the proportion of decadent plants in the population increased to 57%. The somewhat scarce bitterbrush are sought out by livestock and deer. With continued heavy utilization, competition, and extended drought (1987-90), it has resulted in a decline in density. There are as many bitterbrush skeletons as living plants. The remaining plants are severely clubbed and decadent with poor vigor. Due to the extremely low leader growth this year, little forage production is available. Eighty-eight percent of the population was classified as decadent. Rabbitbrush and prickly-pear cactus have not increased. Grass density is low and forbs are still uncommon. Even with the limited perennial understory (cheatgrass is common), there is adequate ground cover with no sign of erosion.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - stable (3)

1996 TREND ASSESSMENT

The trend for soil is stable with good litter and vegetative cover and percent bare ground has decreased slightly. Bitterbrush appears to have stabilized at a lower density, with improved vigor. In addition, percent decadence has dropped from 88% down to only 11% even though use is about the same as it was in 1990. The key browse species for this site is mountain big sagebrush which makes up 96% of the browse cover. It also has greatly improved vigor, lower use, and percent decadence has decreased from 57% to 20%. The age structure for both species is mostly mature, but both species are long-lived and appear to have “weathered” the extended drought (1987-90) for now. Trend for browse is slightly improving. Trend for the herbaceous understory is slightly down. Perennial grass sum of nested frequency is down slightly, as it is for perennial forbs.

TREND ASSESSMENT
soil - stable (3)
browse - slightly improved (4)
herbaceous understory - slightly down (2)

2001 TREND ASSESSMENT

Trend for soil is down slightly due to a 40% increase in cover of bare ground and a slight decline in litter cover. There is still good protective ground cover and erosion is not currently a problem. The soil erosion condition class was determined as stable. Trend for browse is down slightly. Density and utilization of the key species, mountain big sagebrush, has remained similar to 1996 estimates. However, due to the high interspecific competition combined with drought, percent decadence has increased from 20% to 37%. In addition, 22% of the sagebrush sampled display poor vigor, up from 3% in 1996. The sagebrush on this site needs thinning. Average cover is estimated at 31% which is high enough to suppress understory species. Thinning would also improve the general health of the stand. Sagebrush recruitment is currently poor and the population will likely decline slightly in density in the future. Antelope bitterbrush is of secondary importance due to its low abundance. It displays continued moderate to heavy use but vigor is good and no decadent plants were sampled. Trend for the herbaceous understory is up. Sum of nested frequency for perennial grasses and forbs has increased while nested frequency of cheatgrass has declined significantly. Sandberg bluegrass increased significantly in nested frequency as all other perennial grasses remained stable. Perennial forbs are still lacking but nested frequency for silky milkvetch increased significantly. It now produces over half of the forb cover. Several small annual forbs also increased significantly in nested frequency.

TREND ASSESSMENT
soil - down slightly (2)
browse - down slightly (2)
herbaceous understory - up (5)

HERBACEOUS TRENDS --
Herd unit 07 , Study no: 7

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	8	13	10	19	3	4	3	6	.68	.48
G	Agropyron dasystachyum	$_{c}$87	$_{b}$34	$_{a}$3	$_{ab}$11	38	13	1	5	.00	.08
G	Agropyron spicatum	$_{a}$25	$_{b}$79	$_{c}$124	$_{bc}$87	14	30	39	35	2.71	2.32
G	Bromus japonicus (a)	-	-	-	3	-	-	-	1	-	.00
G	Bromus tectorum (a)	-	-	$_{b}$276	$_{a}$157	-	-	84	62	7.47	1.51
G	Elymus cinereus	-	-	7	-	-	-	2	-	.03	.00
G	Poa secunda	$_{a}$38	$_{c}$141	$_{b}$84	$_{c}$169	16	60	35	61	2.37	5.51
G	Sitanion hystrix	$_{a}$13	$_{ab}$25	$_{b}$33	$_{b}$36	6	15	19	18	.92	.60
Total for Annual Grasses		0	0	276	160	0	0	84	63	7.47	1.51
Total for Perennial Grasses		171	292	261	322	77	122	99	125	6.72	9.02
Total for Grasses		171	292	537	482	77	122	183	188	14.19	10.53
F	Agoseris glauca	$_{a}$-	$_{b}$9	$_{ab}$2	$_{a}$-	-	5	1	-	.01	-
F	Allium acuminatum	3	-	-	-	2	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	18	20	-	-	8	8	.04	.07
F	Allium spp.	-	-	-	2	-	-	-	1	-	.00

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Arabis spp.	-	1	-	6	-	1	-	2	-	.03
F	Astragalus cibarius	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$113	-	-	-	49	-	3.39
F	Astragalus convallarius	8	6	3	10	4	3	1	3	.00	.04
F	Astragalus spp.	2	-	5	-	1	-	3	-	.01	-
F	Calochortus nuttallii	1	-	-	-	1	-	-	-	-	-
F	Collomia linearis (a)	-	-	$_{a}$18	$_{b}$76	-	-	8	37	.09	.40
F	Collinsia parviflora (a)	-	-	$_{a}$15	$_{b}$103	-	-	5	37	.02	1.18
F	Crepis acuminata	8	13	7	6	4	9	3	2	.06	.06
F	Draba spp. (a)	-	-	-	2	-	-	-	2	-	.03
F	Epilobium brachycarpum (a)	-	-	1	-	-	-	1	-	.00	-
F	Erigeron pumilus	7	3	-	-	4	2	-	-	-	-
F	Gayophytum ramosissimum (a)	-	-	-	4	-	-	-	1	-	.03
F	Holosteum umbellatum (a)	-	-	-	11	-	-	-	6	-	.08
F	Lomatium triternatum	-	-	3	1	-	-	1	1	.00	.00
F	Lupinus argenteus	$_{a}$-	$_{a}$-	$_{ab}$2	$_{b}$19	-	-	2	7	.15	.14
F	Microsteris gracilis (a)	-	-	$_{a}$-	$_{b}$13	-	-	-	6	-	.03
F	Orthocarpus spp. (a)	-	-	$_{a}$4	$_{b}$36	-	-	4	16	.08	.42
F	Phlox longifolia	$_{a}$-	$_{b}$23	$_{a}$2	$_{b}$23	-	12	1	10	.00	.07
F	Ranunculus testiculatus (a)	-	-	-	1	-	-	-	1	-	.00
F	Senecio integerrimus	-	-	-	2	-	-	-	1	-	.03
F	Taraxacum officinale	-	-	-	1	-	-	-	1	-	.03
F	Unknown forb-perennial	$_{b}$16	$_{a}$-	$_{a}$-	$_{a}$-	8	-	-	-	-	-
F	Vicia americana	-	4	-	-	-	2	-	-	-	-
Total for Annual Forbs		0	0	56	266	0	0	26	114	0.23	2.26
Total for Perennial Forbs		45	59	24	183	24	34	12	77	0.25	3.81
Total for Forbs		45	59	80	449	24	34	38	191	0.50	6.08

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 7

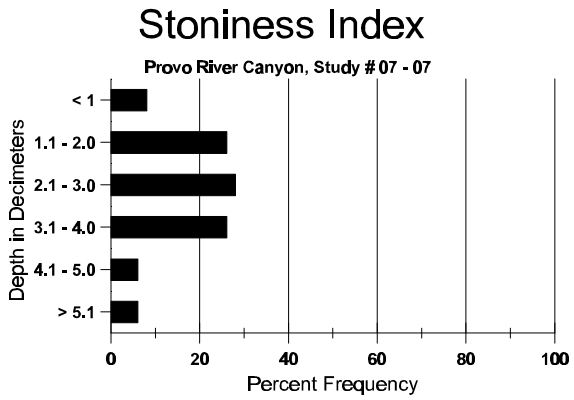
Type	Species	Strip Frequency '96	Strip Frequency '01	Average Cover % '96	Average Cover % '01
B	Amelanchier alnifolia	0	0	-	.00
B	Artemisia tridentata vaseyana	94	92	32.32	31.06
B	Chrysothamnus viscidiflorus viscidiflorus	1	1	.00	.03
B	Opuntia spp.	5	3	.03	.03
B	Purshia tridentata	9	9	1.14	1.87
Total for Browse		109	105	33.51	33.00

BASIC COVER --
Herd unit 07 , Study no: 7

Cover Type	Nested Frequency '96	Nested Frequency '01	Average Cover % '84	Average Cover % '90	Average Cover % '96	Average Cover % '01
Vegetation	350	332	2.00	6.50	50.12	50.18
Rock	91	52	.25	1.25	1.44	1.78
Pavement	106	114	1.75	3.75	.66	1.12
Litter	398	386	69.50	66.25	58.95	50.43
Cryptogams	106	96	13.25	14.00	4.69	7.43
Bare Ground	149	182	13.25	8.25	7.22	18.03

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 07, Provo River Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.7	55.6 (15.6)	6.6	41.8	27.4	30.7	3.6	23.2	275.2	.4



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 7

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Rabbit	9	31	1027	N/A
Elk	2	-	35	3 (7)
Deer	30	26	452	35 (86)
Cattle	-	-	17	1 (3)

BROWSE CHARACTERISTICS --
Herd unit 07 , Study no: 7

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'84	00%	00%	00%
'90	00%	00%	00%
'96	00%	00%	00%
'01	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	0		-
	'01	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	5	-	-	-	-	-	-	-	-	4	-	1	-	333			5
	90	6	1	1	5	-	-	-	-	-	10	-	3	-	866			13
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	84	13	28	18	-	-	-	-	-	-	57	-	2	-	3933	33	28	59
	90	4	14	6	2	-	-	-	-	-	22	-	4	-	1733	30	27	26
	96	86	67	4	1	-	-	-	-	-	158	-	-	-	3160	34	51	158
	01	65	47	7	11	-	-	-	-	-	108	1	21	-	2600	36	43	130
D	84	5	10	16	-	-	-	-	-	-	23	-	8	-	2066			31
	90	14	25	10	2	1	-	-	-	-	31	1	7	13	3466			52
	96	23	9	7	2	1	-	-	-	-	35	-	-	7	840			42
	01	48	21	7	2	-	2	-	-	-	52	2	6	20	1600			80
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	920			46
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	720			36

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	40%	36%	12%	- 4%
'90	45%	19%	30%	-32%
'96	37%	05%	03%	+ 4%
'01	32%	07%	22%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	6332	Dec:	33%
	'90	6065		57%
	'96	4120		20%
	'01	4280		37%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133	11	10	2
	90	1	-	-	1	-	-	1	-	-	1	-	2	-	200	12	14	3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	-	1
D	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	-20%
'90	00%	00%	50%	-92%
'96	00%	00%	00%	+ 0%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	332	Dec:	40%
	'90	266		25%
	'96	20		0%
	'01	20		0%

Opuntia spp.																		
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	6	21	1
	90	-	-	-	-	-	-	2	-	-	2	-	-	-	133	6	7	2
	96	8	-	-	1	1	-	-	-	-	10	-	-	-	200	6	22	10
	01	2	-	-	1	-	-	-	-	-	3	-	-	-	60	5	18	3
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+50%
'90	00%	00%	00%	+34%
'96	10%	00%	00%	-70%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	66	Dec:	-
	'90	133		-
	'96	200		-
	'01	60		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	1	-	2	-	-	-	-	-	-	3	-	-	-	200	33	34	3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	4	1	1	1	-	-	-	8	-	-	-	160	25	47	8
	01	-	4	4	2	-	2	-	-	-	12	-	-	-	240	29	42	12
D	84	-	-	10	-	-	-	-	-	-	5	-	5	-	666			10
	90	-	2	3	-	-	-	1	-	1	1	-	-	6	466			7
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	92%	38%	-39%
'90	25%	63%	75%	-66%
'96	11%	67%	00%	+25%
'01	33%	50%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	866	Dec:	77%
	'90	532		88%
	'96	180		11%
	'01	240		0%

Trend Study 7-8-01

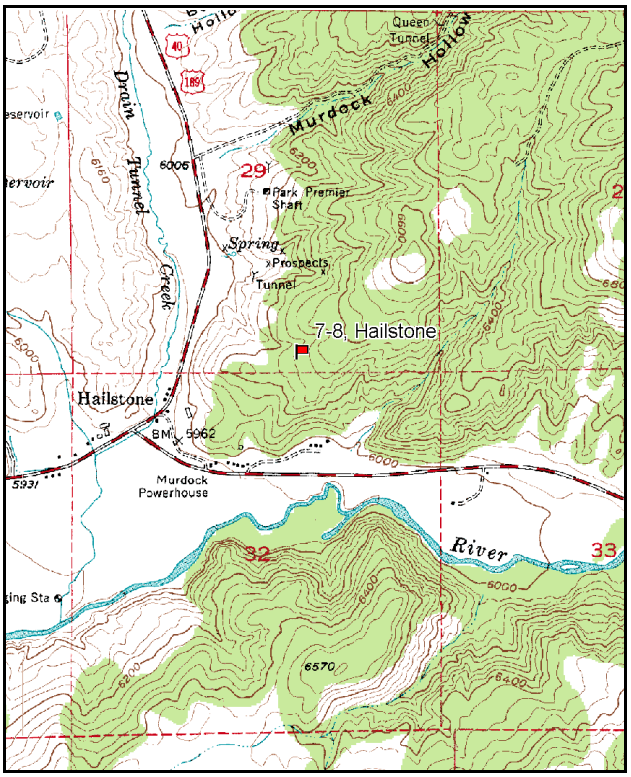
Study site name: Hailstone . Vegetation type: Big Sagebrush-Grass .

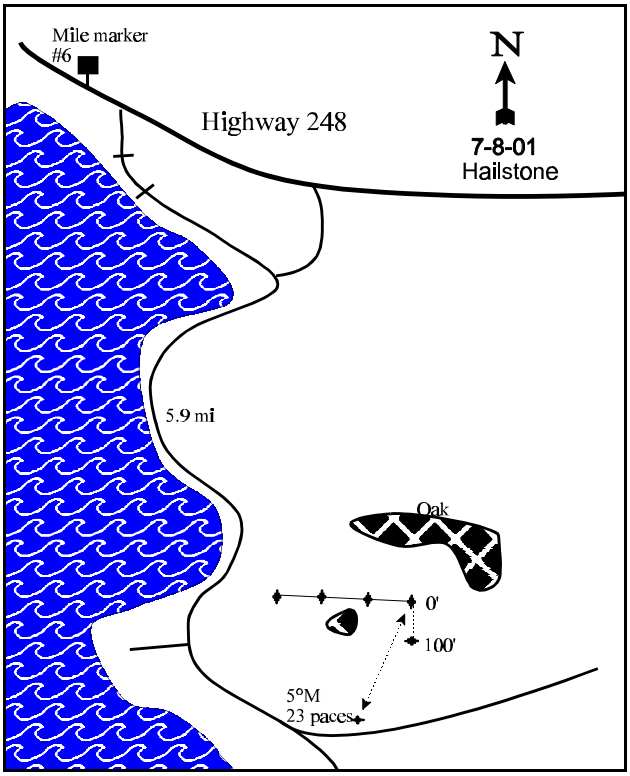
Compass bearing: frequency baseline 159 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (59ft), line 3 (71ft), line 4 (34ft).

LOCATION DESCRIPTION

Just past mile marker #6 on highway 248, turn right (south) and follow the road around the east side of Jordanelle Reservoir for 5.9 miles to a fork in the road and a witness post. The fork is 0.3 miles east of the monument. From the witness post walk 23 paces at 5 degrees magnetic to the 0-foot baseline stake. Line 1 of the baseline runs 159 degrees magnetic. The rest of the baseline runs off the 0-foot baseline stake at a bearing of 248 degrees magnetic. If the gates are locked at the beginning, either obtain a key from the regional biologist, find another way around the fence or go up the road and follow the power line road which comes out above the site. It is advisable to notify a state park ranger of intentions to drive to site.





Map Name: Heber

Diagrammatic Sketch

Township 2S , Range 5E , Section 29

UTM 4495365 N 465957 E

DISCUSSION

Trend Study No. 7-8

The Hailstone trend study was originally established northeast of the old Hailstone Junction of highways 40 and 32. With the creation of Jordanelle reservoir, the trend study is now located about one-half of a mile from the east shore of the reservoir. This site was established in 1984. The study area consists of mixed mountain big sagebrush-grass with scattered clumps of Gambel oakbrush. It received relatively little deer or elk use in 1984 and 1990, but the area has become much more important after Jordanelle Reservoir was constructed. With Jordanelle completed in the early 1990's, north to south movements across the Provo River become impossible, or at least very difficult, and the winter range on the north and east side of the reservoir became more vital than was the case in 1984. The site is placed on a southwest facing ridge with a moderate slope of 15% to 18%. Elevation is about 6,200 feet. Quadrat frequency of deer pellet groups was moderate at 25% in 1996 and slightly higher at 29% in 2001. A pellet group transect read on the site in 2001 estimated 55 deer days use/acre (136 ddu/ha). A couple of elk pellet groups were also encountered. Most of the deer pellet groups appear to be recent, indicating use during the summer.

Soil type is very similar to that described for Study Number 7-7 with a slightly higher surface rock cover. Soil is classified as mountain Stoney loam. Permeability is moderate, available water capacity is low and root penetration is somewhat limited. These soils have a moderately low erosion hazard. Effective rooting depth is estimated at almost 12 inches with a slightly acidic soil reaction (6.5 pH). The soil texture is a clay loam with an organic matter content of 4.6%. There is abundant vegetation and litter cover leaving little unprotected bare soil. There is little erosion occurring and the erosion condition class was determined to be stable in 2001. Where limited erosion has occurred in the past, it now appears stable. Erosion is minimal except where roads, power line construction, and quarrying activity have occurred. These areas are subject to some active gully formation.

This study is within a mountain big sagebrush-grass opening that is characterized by a moderately dense stand of large mountain big sagebrush, with lesser amounts of mountain snowberry, antelope bitterbrush, and Gambel oak interspersed throughout. Sagebrush totally dominates the browse component on the site by providing about 90% of the browse cover. At first glance, the big sagebrush population appears highly decadent, in fact, many of the large older plants do have appreciable percentages of dead crown. Utilization, however, is uniformly light, indicating other causes for the high percent decadence. Crown die-back is most likely the result of winter injury, drought, and intraspecies competition. The population is comprised primarily of large mature plants that in the past were mostly decadent. About half of the plants sampled in 1984 and 1990 were decadent. Density was estimated at nearly 8,000 plants/acre in 1984, declining to 6,799 in 1990. A larger sample was taken in 1996, which is more representative of the area. Density was estimated at 4,560 plants/acre in 1996 and percent decadence declined to 18%. The population remained at a stable density in 2001, but percent decadence nearly doubled to 33%. In addition, 36% (547 plants/acre) of the decadent plants sampled were classified as dying. Reproduction has been good in most years but young plants accounted for only 3% of the population in 2001, down from 11% in 1996. The big sagebrush population will continue to dominant this community and will continue to suppress other shrub and herbaceous species.

Understory vegetation is sparse and consists largely of cheatgrass brome, Kentucky bluegrass, Sandberg bluegrass, and a wide variety of forbs. The most important and palatable perennial forbs consist of showy goldeneye, silky lupine, and redroot eriogonum.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable. Although there are a few long established gullies in the vicinity, these are not rapidly expanding. Sheet erosion is evident but is of small magnitude. Soil loss does not appear growth limiting. However, this area does have a shallow soil that has moderate to high erosion potential. Soil trend deserves careful monitoring. Vegetative trend also appears stable. The Gambel oakbrush areas are static in terms of the area they occupy. Oak may be growing in height and becoming even more exclusive of other vegetation. Oak clumps customarily have almost no understory and litter provides a nearly complete ground cover. In the mountain big sagebrush areas, there have been very slight but perhaps temporary improvements in understory diversity and production. Overall trend for these areas is judged stable because no significant signs of change in the dominant sagebrush population can be detected.

1990 TREND ASSESSMENT

Mountain big sagebrush has less growth and seed production, although vigor is normal compared to the wet year when the study was established. The shrubs are moderately to heavily hedged. Sagebrush density shows a slight decrease (15%). A lower percentage (46%) of decadent plants was classified in 1990, which is still high. Sagebrush cover averages almost 30%. Seedlings are abundant this year. Frequencies of the other browse species remain low but stable. Oakbrush has not increased. Oak shows moderate hedging on the available stems, more use than typically observed on oak on this type of site. The grass sum of nested frequency is extremely low and the herbaceous component is lacking. Ground cover percentages are also unchanged. There is adequate litter and aerial vegetative cover with no significant erosion.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable, but still poor condition (3)

1996 TREND ASSESSMENT

Trend for soils is stable with an excellent ratio of protective cover (vegetation and litter) to bare ground. The only negative aspect is that most of the vegetative cover is made up of sagebrush which is not as effective at preventing erosion as herbaceous cover. The key browse species is obviously sagebrush, which contributes 93% of the browse cover. The age structure is drifting again to a mostly mature population. Percent decadence has decreased from 57% in 1984, to 46% in 1990, and down to 18% in 1996. The population appears stable now, with the thinning effect of long-term drought (1987-90) and intraspecific competition. The herbaceous understory trend for perennial species is slightly improved, but still in very poor condition (composition and abundance).

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - up slightly but poor (4)

2001 TREND ASSESSMENT

Trend for soil continues to be stable with abundant vegetation and litter cover to prevent most erosion. Unfortunately most of the vegetation cover comes from sagebrush which is not as effective as herbaceous cover at preventing erosion. Trend for the key browse species, mountain big sagebrush, is stable. The sagebrush population has remained stable, but percent decadence has increased from 18% to 33%. In

addition, 36% of the decadent sagebrush sampled were classified as dying (>50% crown death) which is equivalent to 547 plants/acre. Young recruitment is currently not adequate to maintain the current population. The population may thin slightly in the future, but this would be a positive change considering the density of the sagebrush stand. Trend for the herbaceous understory is up but still limited by sagebrush. Sum of nested frequency for perennial grasses increased slightly, while sum of nested frequency for perennial forbs more than doubled. Perennial grasses are still limited but nested frequency of Kentucky bluegrass increased significantly. Another positive change is the significant decline in the nested frequency of cheatgrass. Cover of cheatgrass also declined from 15% to only 2%. The dramatic increase in the sum of nested frequency for perennial forbs comes primarily from the significant increase in the nested frequency of silky lupine. Average cover of lupine also increased from less than 1% in 1996 to 6% in 2001. Wild onion, a milkvetch, and longleaf phlox also increased significantly in nested frequency. Sum of nested frequency and cover of annual forbs remained similar to 1996.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - up, but still very limited (5)

HERBACEOUS TRENDS --
Herd unit 07 , Study no: 8

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	-	1	5	6	-	1	3	3	.09	.18
G	Bromus japonicus (a)	-	-	2	7	-	-	1	3	.00	.01
G	Bromus tectorum (a)	-	-	b342	a175	-	-	96	68	14.50	1.48
G	Carex spp.	-	-	-	5	-	-	-	2	.03	.38
G	Poa pratensis	a4	a10	b55	c83	1	4	15	26	2.68	3.49
G	Poa secunda	-	-	4	-	-	-	1	-	.00	-
G	Sitanion hystrix	a-	a2	b33	b48	-	1	14	21	1.06	2.17
G	Stipa lettermani	-	2	3	3	-	1	1	1	.15	.03
Total for Annual Grasses		0	0	344	182	0	0	97	71	14.50	1.49
Total for Perennial Grasses		4	15	100	145	1	7	34	53	4.01	6.27
Total for Grasses		4	15	444	327	1	7	131	124	18.52	7.77
F	Achillea millefolium	-	-	1	-	-	-	1	-	.03	-
F	Alyssum alyssoides (a)	-	-	4	2	-	-	2	1	.01	.00
F	Allium spp.	a-	a-	b21	c59	-	-	11	25	.05	.27
F	Artemisia ludoviciana	6	-	1	2	2	-	1	1	.00	.03
F	Aster chilensis	-	-	7	8	-	-	2	3	.30	.33
F	Astragalus convallarius	5	3	4	9	2	1	2	5	.01	.36
F	Astragalus spp.	a-	a-	a-	b12	-	-	-	5	-	.67
F	Camelina microcarpa (a)	-	-	3	2	-	-	1	1	.00	.00
F	Calochortus nuttallii	-	-	-	9	-	-	-	4	-	.02

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Chenopodium fremontii (a)	-	-	-	1	-	-	-	1	-	.00
F	Cirsium undulatum	10	4	8	12	6	2	5	4	.21	.53
F	Collomia linearis (a)	-	-	52	62	-	-	27	30	.16	.15
F	Comandra pallida	4	-	2	13	2	-	1	4	.04	.12
F	Collinsia parviflora (a)	-	-	$_{a}$5	$_{b}$71	-	-	3	27	.01	.45
F	Cordylanthus ramosus (a)	-	-	43	23	-	-	19	12	.95	.76
F	Epilobium brachycarpum (a)	-	-	$_{b}$112	$_{a}$20	-	-	51	12	.94	.11
F	Erigeron spp.	-	-	1	-	-	-	1	-	.00	-
F	Eriogonum racemosum	14	14	11	14	7	8	6	8	.11	.12
F	Galium aparine (a)	-	-	-	3	-	-	-	1	-	.00
F	Hedysarum boreale	$_{b}$6	$_{a}$-	$_{a}$1	$_{a}$-	5	-	1	-	.00	-
F	Holosteum umbellatum (a)	-	-	$_{a}$-	$_{b}$12	-	-	-	5	-	.05
F	Lithospermum ruderale	-	3	-	-	-	1	-	-	-	-
F	Lomatium spp.	-	-	4	7	-	-	2	4	.01	.04
F	Lupinus argenteus	$_{b}$75	$_{a}$15	$_{a}$14	$_{b}$113	35	7	7	46	.69	6.10
F	Microsteris gracilis (a)	-	-	$_{a}$3	$_{b}$13	-	-	1	8	.00	.04
F	Phlox longifolia	$_{a}$-	$_{a}$4	$_{b}$22	$_{c}$37	-	2	10	16	.22	.18
F	Polygonum douglasii (a)	-	-	86	100	-	-	36	42	.18	.26
F	Ranunculus testiculatus (a)	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$81	-	-	-	30	-	.74
F	Tragopogon dubius	-	-	3	1	-	-	1	1	.00	.00
F	Trifolium spp.	-	-	-	7	-	-	-	3	-	.04
F	Verbascum thapsus	6	3	2	-	3	1	1	-	.03	-
F	Vicia americana	-	4	-	-	-	1	-	-	-	-
F	Viguiera multiflora	$_{a}$19	$_{b}$51	$_{ab}$27	$_{a}$14	11	23	15	6	.28	.08
Total for Annual Forbs		0	0	308	390	0	0	140	170	2.28	2.59
Total for Perennial Forbs		145	101	129	317	73	46	67	135	2.01	8.93
Total for Forbs		145	101	437	707	73	46	207	305	4.30	11.53

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 8

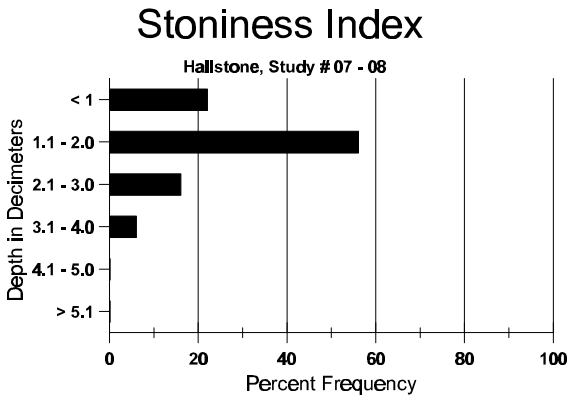
Type	Species	Strip Frequency '96	Strip Frequency '01	Average Cover % '96	Average Cover % '01
B	Amelanchier alnifolia	0	3	-	.41
B	Artemisia tridentata vaseyana	99	93	29.54	34.81
B	Chrysothamnus viscidiflorus viscidiflorus	2	3	.03	.15
B	Mahonia repens	11	17	.87	.83
B	Opuntia spp.	1	1	.03	.15
B	Purshia tridentata	4	5	.68	1.06
B	Quercus gambelii	3	7	.06	.68
B	Symphoricarpos oreophilus	9	10	.51	.63
Total for Browse		129	139	31.73	38.73

BASIC COVER --
Herd unit 07 , Study no: 8

Cover Type	Nested Frequency '96	Nested Frequency '01	Average Cover % '84	Average Cover % '90	Average Cover % '96	Average Cover % '01
Vegetation	376	337	1.50	5.00	47.30	55.46
Rock	209	166	11.00	5.50	3.26	3.40
Pavement	210	260	8.75	15.50	5.63	11.04
Litter	397	378	70.25	66.75	56.90	51.26
Cryptogams	9	8	0	0	.12	.12
Bare Ground	174	164	8.50	7.25	6.07	7.04

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 08, Hailstone

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.6	53.0 (13.8)	6.5	40.2	29.1	30.7	4.6	41.6	377.6	.6



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 8

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre ⁽01	Days Use per Acre (ha) ⁽01
Rabbit	5	2	-	-
Elk	1	-	17	1 (3)
Deer	25	29	713	55 (136)

BROWSE CHARACTERISTICS --
Herd unit 07 , Study no: 8

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	1	-	-	-	-	1	-	-	-	20			1
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133	19	14	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19	14	0
	01	-	-	1	-	1	-	-	-	-	2	-	-	-	40	26	43	2
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	1	-	-	-	-	1	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	-50%
'90	00%	00%	100%	
'96	00%	00%	00%	
'01	67%	33%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	133	Dec:		0%
'90	66			100%
'96	0			0%
'01	60			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	84	10	-	-	-	-	-	-	-	-	10	-	-	-	666			10
	90	47	-	-	-	-	-	16	-	-	63	-	-	-	4200			63
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	01	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
Y	84	23	-	-	-	-	-	-	-	-	23	-	-	-	1533			23
	90	15	2	1	2	-	-	2	-	-	22	-	-	-	1466			22
	96	25	-	-	-	-	-	-	-	-	25	-	-	-	500			25
	01	4	3	-	-	-	-	-	-	-	7	-	-	-	140			7
M	84	22	7	-	-	-	-	-	-	-	29	-	-	-	1933	23	25	29
	90	11	17	5	-	-	-	-	-	-	32	-	1	-	2200	28	35	33
	96	131	28	-	2	-	-	-	-	-	161	-	-	-	3220	24	48	161
	01	134	2	3	9	-	-	-	-	-	148	-	-	-	2960	26	38	148
D	84	47	21	-	-	-	-	-	-	-	67	-	-	1	4533			68
	90	12	20	12	2	1	-	-	-	-	30	-	1	16	3133			47
	96	26	12	3	1	-	-	-	-	-	26	-	-	16	840			42
	01	69	2	1	4	-	-	-	-	-	49	-	-	27	1520			76
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	820			41
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	500			25

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	23%	00%	.83%	-15%
'90	39%	18%	18%	-33%
'96	18%	01%	07%	+ 1%
'01	03%	02%	12%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	7999	Dec:	57%
	'90	6799		46%
	'96	4560		18%
	'01	4620		33%

Cercocarpus montanus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	28	16	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	0		-
	'01	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	1	-	-	1	-	-	2	-	-	-	133			2
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133	9	4	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12	11	1
	01	1	-	-	2	-	-	-	-	-	3	-	-	-	60	11	12	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	-33%
'90	00%	00%	00%	-70%
'96	00%	00%	00%	+33%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	199	Dec:		-
'90	133			-
'96	40			-
'01	60			-

Mahonia repens																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	20	-	-	-	-	-	-	-	-	20	-	-	-	400			20
	01	7	-	-	4	-	-	-	-	-	11	-	-	-	220			11
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	44	-	-	-	-	-	-	-	-	44	-	-	-	880	28	31	44
	01	136	-	-	78	-	-	56	-	-	270	-	-	-	5400	3	5	270
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+77%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'84	0	Dec:	-
'90	0		-
'96	1280		-
'01	5620		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	9	-	-	-	-	-	-	-	-	9	-	-	-	600	4	5	9
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133	6	13	2
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	5	24	3
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	5	6	3
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+25%
'90	00%	00%	00%	-92%
'96	00%	00%	00%	+ 0%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	600	Dec:	0%
	'90	799		8%
	'96	60		0%
	'01	60		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
S	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	1	-	-	2	-	-	2	-	1	-	200			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	1	2	1	-	-	-	-	-	-	4	-	-	-	266	14	18	4
	90	-	1	2	-	1	-	-	-	-	4	-	-	-	266	7	23	4
	96	-	-	2	1	-	-	-	-	-	3	-	-	-	60	22	41	3
	01	-	-	2	-	-	-	-	-	-	2	-	-	-	40	24	45	2
D	84	-	3	4	-	-	-	-	-	-	7	-	-	-	466			7
	90	-	-	2	-	-	-	-	-	-	2	-	-	-	133			2
	96	-	-	-	-	-	1	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	3	-	-	1	3	-	-	1	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	42%	42%	00%	-25%
'90	22%	44%	11%	-87%
'96	00%	75%	00%	+33%
'01	00%	100%	17%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	798	Dec:		58%
'90	599			22%
'96	80			25%
'01	120			67%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Quercus gambelii																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	90	-	3	-	-	-	-	-	-	-	3	-	-	-	200			3
	96	1	-	-	2	-	-	-	-	-	3	-	-	-	60			3
	01	6	-	-	3	-	-	3	-	-	12	-	-	-	240			12
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66	43	25	1
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66	57	19	1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	48	47	1
	01	8	-	-	-	-	-	-	-	-	8	-	-	-	160	27	16	8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	17%	00%	00%	-33%
'90	100%	00%	00%	-70%
'96	00%	00%	00%	+80%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	399	Dec:	-
	'90	266		-
	'96	80		-
	'01	400		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	84	36	-	-	-	-	-	-	-	-	36	-	-	-	2400			36
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	1	-	-	2	-	-	-	-	-	3	-	-	-	200			3
	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133	14	16	2
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66	5	4	1
	96	4	-	-	8	-	-	-	-	-	12	-	-	-	240	16	20	12
	01	3	-	-	4	-	-	1	-	-	7	1	-	-	160	20	31	8
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	1	-	-	-	-	-	-	-	1	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	5	-	-	-	-	-	-	-	-	1	-	-	4	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+40%
'90	00%	00%	20%	-16%
'96	00%	00%	00%	- 7%
'01	00%	00%	31%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	199	Dec:		0%
'90	332			20%
'96	280			0%
'01	260			38%

Trend Study 7-9-01

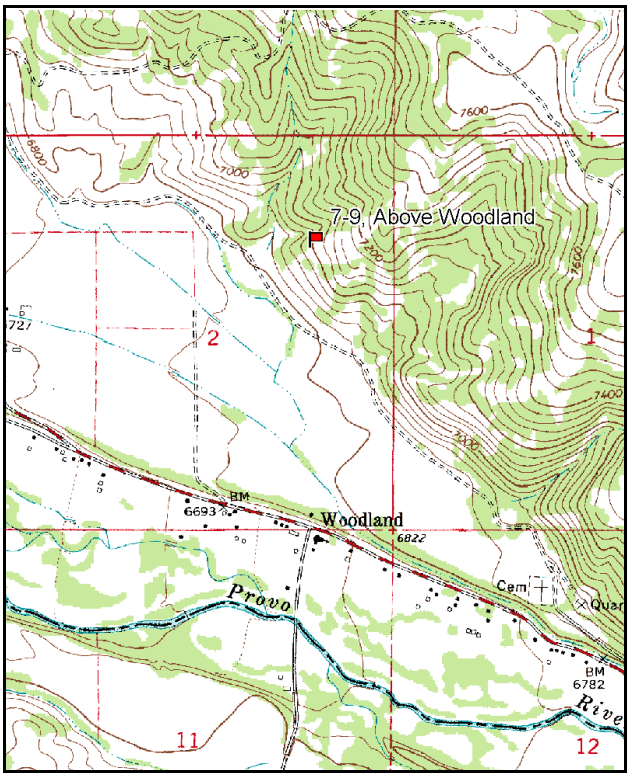
Study site name: Above Woodland . Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 76 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

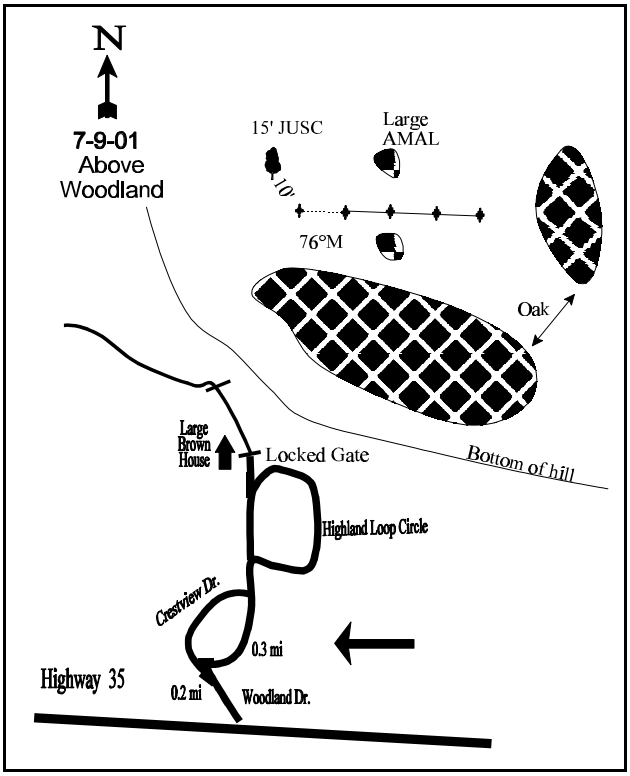
LOCATION DESCRIPTION

From the intersection of Highway 35 and Woodland Drive, west of Woodland, turn onto Woodland Drive and proceed 0.2 miles. Turn onto Crestview Drive and proceed 0.3 miles to Highland Loop Circle. Turn left and follow the circle 0.1 miles to a dirt road. Travel along the road past a large brown house to a fork after 0.15 miles to a gate. From here cross the fence and walk up the slope. Walk around the west end of a large oak clone and continue up the slope. Look for a large, lone high lined Rocky Mountain Juniper. The 0-foot baseline is ten feet from this tree. The baseline runs between a couple of large serviceberry.



Map Name: Woodland

Township 3S , Range 6E , Section 2



Diagrammatic Sketch

UTM 4493241 N 480844 E

DISCUSSION

Trend Study No. 7-9

The Above Woodland trend study was original established in 1984 sampling a closely intermixed mountain big sagebrush/grass and Gambel oakbrush winter range located north of Woodland. Due to low big game use of the site and low numbers of mountain big sagebrush sampled, the site was moved about a quarter of a mile to the southwest. The new area supports a more dense stand of sagebrush in association with other preferred browse species including serviceberry and bitterbrush. This new site has a southwest aspect with a 25% to 30% slope at about 7,000 feet in elevation. The Provo River winter range in the Woodland area appears to be principally a "normal" deer winter range, although elk and moose pellet groups can also be found. This area is at a high enough elevation that deep snow may preclude use during severe winters. A pellet group transect read on site in 2001 estimate 16 deer and 31 elk days use/acre (40 ddu/ha and 78 edu/ha). All of the elk pellet groups appear to be from winter use while most deer pellets were from spring use.

Soil is moderately deep, but very stony. Surface rocks vary in size from pavement to large rock. Percent surface rock and pavement cover is high at 40%. Soil parent material appears to be sandstone and shale which gives the soil a reddish color. Due to the high rock content of the soil profile, effective rooting depth was estimated at only about 7 inches. The soil is obviously deeper considering the presence of deep rooted shrubs. Soil texture is a clay loam with a slightly acid soil reaction (6.2 pH). There is abundant protective ground cover which leaves little exposed bare ground. There is little soil movement occurring and the soil erosion condition class was determined as stable in 2001.

The browse composition consists primarily of mountain big sagebrush with lesser amounts of serviceberry and antelope bitterbrush. Mountain big sagebrush provides 57% of the total browse cover with a population of 2,260 plants/acre. The population is mostly mature with light use and generally good vigor. Serviceberry numbers 840 plants/acre. Utilization is moderate to heavy but vigor is good and percent decadence is low at 10%. Only a few bitterbrush plants occur on the site. They show moderate use but are vigorous. Other browse encountered include low numbers of dwarf and stickyleaf low rabbitbrush, broom snakeweed, snowberry, gray horsebrush, and high numbers of creeping barberry.

The herbaceous understory is moderately abundant but limited somewhat by competition with shrubs and poor site potential caused by the high rock content of the soil. Perennial grasses are diverse but only three species, bluebunch wheatgrass, Kentucky bluegrass, and Sandberg bluegrass are abundant. Annual grasses, Japanese brome and cheatgrass also occur but they are not very abundant. Forbs are also diverse with 24 species identified. The only moderately abundant perennial forbs consist of Louisiana sage and silvery lupine which provide 76% of the forb cover. Most other forbs occur infrequently. Little use was found on grasses or forbs.

2001 APPARENT TREND ASSESSMENT

Soil conditions appear stable with little erosion occurring due to the abundant protective ground cover. Browse populations appear stable with mostly light use and good vigor of the mountain big sagebrush. Serviceberry is more heavily used but it also displays good vigor. The herbaceous understory is diverse but only a few species are very abundant. Grasses and forbs are probably limited by competition with shrubs and a poor site potential. Soil on the site is very rocky on the surface and throughout the profile.

HERBACEOUS TRENDS --
Herd unit 07 , Study no: 9

Type	Species	Nested Frequency '01	Quadrat Frequency '01	Average Cover % '01
G	Agropyron spicatum	198	56	9.50
G	Agropyron trachycaulum	17	6	.54
G	Bromus carinatus	1	1	.03
G	Bromus japonicus (a)	135	52	1.26
G	Bromus tectorum (a)	48	24	.39
G	Koeleria cristata	8	4	.56
G	Poa fendleriana	28	12	.23
G	Poa pratensis	87	30	1.56
G	Poa secunda	135	41	1.94
G	Sitanion hystrix	23	8	.43
Total for Annual Grasses		183	76	1.65
Total for Perennial Grasses		497	158	14.80
Total for Grasses		680	234	16.46
F	Agoseris glauca	7	3	.01
F	Alyssum alyssoides (a)	55	28	.19
F	Allium spp.	36	18	.11
F	Arabis spp.	4	3	.06
F	Artemisia ludoviciana	40	14	1.64
F	Calochortus nuttallii	6	3	.01
F	Cirsium undulatum	8	4	.10
F	Collomia linearis (a)	44	19	.12
F	Collinsia parviflora (a)	24	8	.04
F	Cymopterus spp.	3	1	.00
F	Descurainia pinnata (a)	8	2	.01
F	Epilobium brachycarpum (a)	3	1	.01
F	Eriogonum racemosum	4	2	.06
F	Eriogonum umbellatum	4	1	.01
F	Galium aparine (a)	3	2	.03
F	Holosteum umbellatum (a)	7	3	.01
F	Lupinus argenteus	10	4	.97
F	Microsteris gracilis (a)	2	1	.00
F	Phlox longifolia	14	6	.03
F	Polygonum douglasii (a)	50	22	.18
F	Senecio integerrimus	2	1	.03

Type	Species	Nested Frequency '01	Quadrat Frequency '01	Average Cover % '01
F	Senecio multilobatus	1	1	.03
F	Tragopogon dubius	25	12	.23
F	Viguiera multiflora	3	3	.09
Total for Annual Forbs		196	86	0.61
Total for Perennial Forbs		167	76	3.42
Total for Forbs		363	162	4.04

BROWSE TRENDS --
Herd unit 07 , Study no: 9

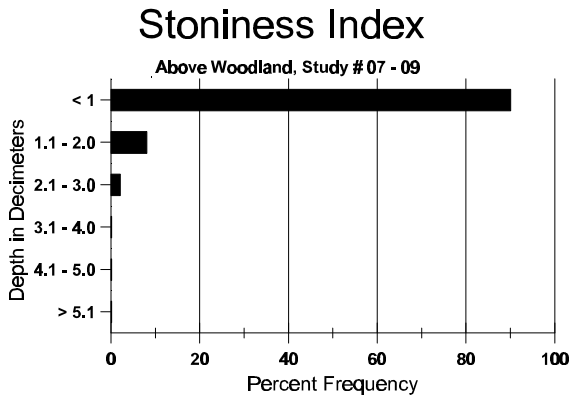
Type	Species	Strip Frequency '01	Average Cover % '01
B	Amelanchier alnifolia	34	6.10
B	Artemisia tridentata vaseyana	62	15.92
B	Chrysothamnus depressus	10	.45
B	Chrysothamnus viscidiflorus viscidiflorus	5	.15
B	Gutierrezia sarothrae	20	.98
B	Mahonia repens	37	1.29
B	Opuntia spp.	9	.03
B	Purshia tridentata	1	1.78
B	Symphoricarpos oreophilus	24	1.37
B	Tetradymia canescens	1	-
Total for Browse		203	28.10

BASIC COVER --
Herd unit 07 , Study no: 9

Cover Type	Nested Frequency '01	Average Cover % '01
Vegetation	404	48.56
Rock	308	23.71
Pavement	315	15.28
Litter	430	36.37
Cryptogams	6	.39
Bare Ground	159	5.36

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 09, Above Woodland

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
6.6	53.0 (6.4)	6.2	36.2	35.4	28.4	3.8	27.6	214.4	.5



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 9

Type	Quadrat Frequency '01	Pellet Transect	
		Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Rabbit	12	148	N/A
Elk	15	409	31 (78)
Deer	7	208	16 (40)

BROWSE CHARACTERISTICS --
Herd unit 07 , Study no: 9

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
S	01	-	-	-	-	-	-	1	-	-	1	-	-	-	20			1
Y	01	5	1	-	1	-	-	-	-	-	7	-	-	-	140			7
M	01	3	15	10	1	2	-	-	-	-	29	-	2	-	620	30	38	31
D	01	1	2	1	-	-	-	-	-	-	3	-	-	1	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'01	48%	26%	07%	

Total Plants/Acre (excluding Dead & Seedlings) '01 840 Dec: 10%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
Y	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	01	79	6	-	-	-	-	-	-	-	85	-	-	-	1700	22	34	85
D	01	23	1	-	-	-	-	-	-	-	15	-	-	9	480			24
X	01	-	-	-	-	-	-	-	-	-	-	-	-	-	680			34
% Plants Showing '01				Moderate Use 06%			Heavy Use 00%				Poor Vigor 08%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'01		2260	Dec:		21%
Chrysothamnus depressus																		
M	01	13	-	-	-	-	-	-	-	-	13	-	-	-	260	7	14	13
% Plants Showing '01				Moderate Use 00%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'01		260	Dec:		-
Chrysothamnus viscidiflorus viscidiflorus																		
M	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140	13	15	7
% Plants Showing '01				Moderate Use 00%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'01		140	Dec:		-
Gutierrezia sarothrae																		
Y	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	01	31	-	-	-	-	-	-	-	-	31	-	-	-	620	8	14	31
D	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
% Plants Showing '01				Moderate Use 00%			Heavy Use 00%				Poor Vigor 03%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'01		700	Dec:		3%
Mahonia repens																		
Y	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	01	531	-	-	-	-	-	-	-	-	531	-	-	-	10620	4	5	531
% Plants Showing '01				Moderate Use 00%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'01		10760	Dec:		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
Y	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	01	16	-	-	-	-	-	-	-	-	16	-	-	-	320	3	8	16
% Plants Showing '01				Moderate Use 00%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'01		340	Dec:		-
Purshia tridentata																		
M	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20	26	122	1
% Plants Showing '01				Moderate Use 100%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'01		20	Dec:		-
Symphoricarpos oreophilus																		
Y	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
M	01	19	-	-	1	-	-	-	-	-	20	-	-	-	400	18	29	20
D	01	4	-	-	-	-	-	-	-	-	3	-	-	1	80			4
% Plants Showing '01				Moderate Use 00%			Heavy Use 00%				Poor Vigor 04%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'01		500	Dec:		16%
Tetradymia canescens																		
M	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing '01				Moderate Use 00%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'01		20	Dec:		-

Trend Study 7-10-01

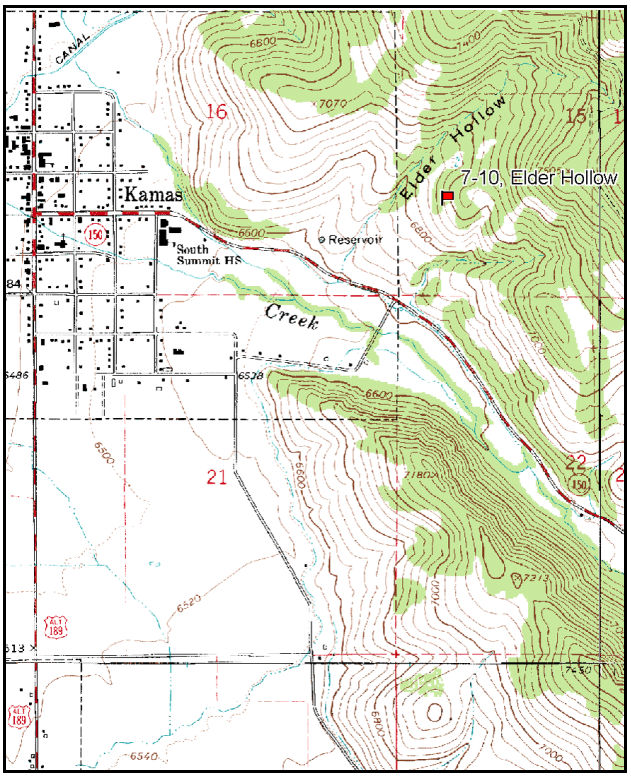
Study site name: Elder Hollow . Vegetation type: Mountain Brush .

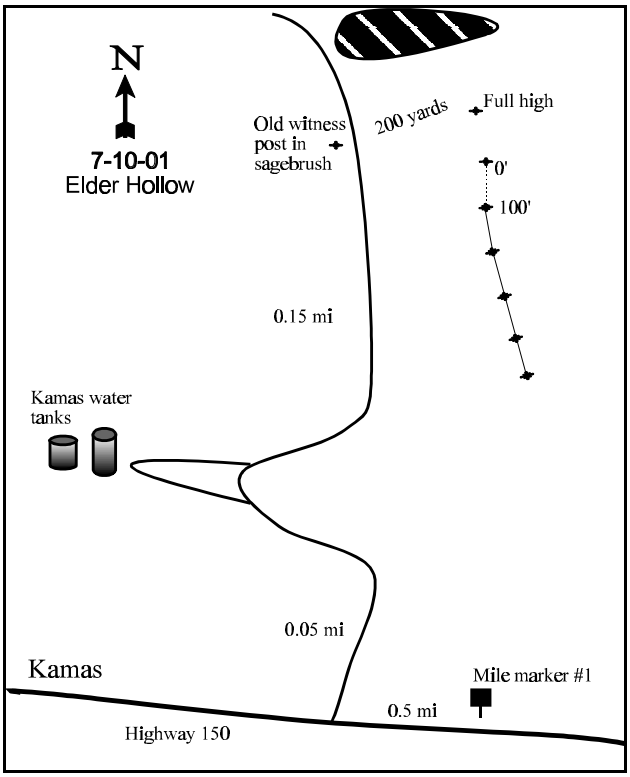
Compass bearing: frequency baseline 169 degrees magnetic.

Frequency belt placement: Line 1 (11ft), Line 2 (59ft), Line 3 (71ft), Line 4 (95ft), Line 5 (34ft).

LOCATION DESCRIPTION

Westbound on Highway 150 (Mirror Lake Highway) from mile marker 1, proceed 0.05 miles to a locked gate on the right. Contact the Wildlife Biologist in the area to obtain a key. The site can also be reached by walking. Proceed through the gate, turn left, travel 0.05 miles, turn right, travel 0.05 miles, bear right, and travel 0.15 miles to green steel stake on the left. The post is in dense sagebrush 3 feet form road. From the post, walk 200 yards at 66 degrees magnetic to a witness post. The 0-foot stake is just a couple of paces south of the witness post. The baseline doglegs down through the same vegetation type. Line 1 runs 169 degrees magnetic. Line 2 runs 151 degrees magnetic. Line 3 runs 149 degrees magnetic. Lines 4 and 5 run 146 degrees magnetic.





Map Name: Kamas

Diagrammatic Sketch

Township 2S , Range 6E , Section 15

UTM 4499007 N 478156 E

DISCUSSION

Trend Study No. 7-10

The Elder Hollow trend study replaces the old Kamas Water Tank trend study established in 1984. The original Kamas Water Tank site sampled critical deer winter range located immediately east of Kamas. When this site was revisited in 1996, the land was for sale. This is a privately owned site that for many years has been intensively grazed by sheep, cattle, and horses. Knowing that this area is important as critical winter range, the study site was moved up the ridge about 200 yards so that the site could be accessible in the future. Furthermore, there was little sign that the old site was used by wildlife, whereas the new site has abundant indications of use. The range type is mountain big sagebrush/grass that also contains an interspersed and diverse population of other shrub species. Elevation of the new site is approximately 7,000 feet. It has a slope of 35-40% and an aspect to the southwest. Deer use was reportedly heavy on the old site, although few pellet groups were present in 1996. Form class analysis of the key browse species indicated only light to moderate use. Wildlife use on the new site is abundant. Pellet group quadrat frequency was 45% for deer and 27% for elk in 1996. During the 2001 reading, pellet group quadrat frequency was 39% for deer and only 3% for elk. A pellet group transect read on the site in 2001 estimated 103 deer, 8 elk, and 6 cow days use/acre (253 ddu/ha, 20 edu/ha, and 14 cud/ha). Most pellet groups appear to be from late winter and early spring use. Cows were on the site within the past few weeks.

Soil is moderately deep with an effective rooting depth of 14 inches. Texture is a sandy clay loam\loam with a neutral soil reaction (7.0 pH). Rock is common on the surface and throughout the soil profile. Protective ground cover of vegetation and litter is abundant but interspaces between shrubs show signs of localized erosion. Terracing along the slope and soil pedestalling on the uphill side of shrubs is common. The erosion condition class was determined as slight in 2001.

The site supports several preferred browse species. These include mountain big sagebrush, serviceberry, bitterbrush, and snowberry. The key species for this site is mountain big sagebrush which made up 72% of the browse cover in 1996 and 61% in 2001. Density of sagebrush was estimated at 2,540 plants/acre in 1996. Utilization was light to moderate, vigor good, and percent decadence moderate at 20%. Approximately 26% of the population consisted of dead plants which appear to have died within the past 10 years or so. Density declined slightly in 2001 to 2,140 plants/acre. Utilization continues to be moderate to heavy. Plants displaying poor vigor increased slightly and percent decadence rose from 20% to 38%. Annual leader growth was poor in 2001 averaging only 1.4 inches. Young recruitment has declined most likely due to the dry spring conditions of the past two years. Spring precipitation (April to June) in 2000 was only 55% of normal at Kamas (Utah climate summaries 2001). Precipitation from April to June was closer to normal in 2001 at 79% of normal, due to above average April precipitation. However, May precipitation was only 28% of normal and June 19% of normal. Dry spring conditions make seedling establishment very difficult.

Serviceberry is moderately abundant with a density of 840 plants/acre estimated in 2001. Mature plants are about 2 feet in height with a crown diameter of nearly 3 feet. Utilization has been moderate to heavy and vigor good. Annual leader growth of serviceberry averaged only 2.3 inches in 2001. The few scattered bitterbrush on the site are heavily browsed but in good vigor. Mature bitterbrush have a low growing, spreading growth form. Average height of mature bitterbrush was only 9 inches in 2001 with a crown diameter of 4 feet. Snowberry has a density of about 1,200 plants/acre. They display mostly light use, good vigor, and low decadence. A few increaser shrubs are found on the site but most occur in limited numbers. Broom snakeweed is abundant but small in stature and providing only 4% to 5% of the browse cover.

Understory growth is limited because of the slope and aspect of the site combined with competition from browse species, especially mountain big sagebrush. A variety of perennial grasses occur on the site but none are abundant. The only common species include Kentucky bluegrass and Sandberg bluegrass. Cheatgrass, an annual, is also moderately abundant. It accounted for 38% of the grass cover in 1996 and 51% in 2001. Forbs are also diverse but most occur only rarely. Common perennials include wavyleaf thistle, redroot eriogonum, silvery lupine, and low penstemon. Annual forbs are also common and produce similar cover as perennial forbs. Annual forbs like pale alyssum, storksbill, and bur buttercup dominate bare areas in the shrub interspaces.

1996 APPARENT TREND ASSESSMENT

The soil trend appears stable with percent bare ground low at only about 6% and a good ratio of bare ground to protective cover (vegetation and litter cover). The key browse species for the site is mountain big sagebrush which provides more than 72% of the browse cover. The population appears stable at this time. The herbaceous understory is dominated by Kentucky bluegrass (an increaser) and cheatgrass (winter annual). These two species contribute 52% of the herbaceous understory cover. There are few desirable forbs on the site. The herbaceous understory is considered stable, but in poor condition because of the composition of increasers and winter annuals.

2001 TREND ASSESSMENT

Trend for soil is slightly down due to an increase in cover for bare ground and a decline in litter cover. Herbaceous cover also declined primarily due to a drop in cover of Kentucky bluegrass. Some erosion is occurring but it is localized and the soil erosion condition class was determined as slight. Trend for browse is stable. Mountain big sagebrush density has declined slightly (16%). Utilization continues to be moderate to heavy with good vigor on all but 29% of the decadent shrubs. Recruitment is currently poor. Serviceberry has increased in density, displays moderate to heavy use, good vigor, with no decadent plants sampled. Snowberry produces 23% of the total browse cover. It has remained stable in density, is only lightly hedged, and in good vigor. Trend for the herbaceous understory is stable. Perennial grasses and forbs are not abundant and combine to produce only 20% cover. Sum of nested frequency for perennial grasses has declined slightly while frequency of perennial forbs has increased slightly. The biggest change for perennial grasses is the significant decline in the nested frequency of Kentucky bluegrass. This is somewhat counterbalanced by a significant increase in crested wheatgrass and Sandberg bluegrass. Kentucky bluegrass is still the most abundant perennial grass. Cheatgrass, an annual, provides half of the total grass cover. It has declined significantly since 1996. Perennial forbs increased slightly in sum of nested frequency. Annual forbs increased substantially and currently produce as much cover as perennial forbs. The largest change comes from the significant increase in bur buttercup.

TREND ASSESSMENT
soil - down slightly (2)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 07 , Study no: 10

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron cristatum	16	*25	7	8	.28	.47
G	Agropyron spicatum	6	11	2	5	.03	.13
G	Bromus carinatus	10	2	6	1	.08	.01
G	Bromus tectorum (a)	303	*277	80	84	3.80	3.95
G	Carex spp.	17	17	6	6	.36	.28
G	Oryzopsis hymenoides	-	3	-	1	.00	.01
G	Poa fendleriana	4	1	3	1	.06	.00
G	Poa pratensis	125	*65	41	24	4.13	.64
G	Poa secunda	50	*74	20	29	.90	1.96
G	Sitanion hystrix	13	25	6	9	.25	.14
G	Stipa comata	-	8	-	3	-	.06
Total for Annual Grasses		303	277	80	84	3.80	3.95
Total for Perennial Grasses		241	231	91	87	6.12	3.72
Total for Grasses		544	508	171	171	9.93	7.68
F	Agoseris glauca	2	13	1	5	.00	.05
F	Alyssum alyssoides (a)	272	316	79	87	1.76	2.36
F	Arabis spp.	-	1	-	1	-	.00
F	Artemisia ludoviciana	14	26	5	9	.22	.58
F	Arabis perennans	6	-	3	-	.01	-
F	Astragalus convallarius	1	*8	1	4	.00	.21
F	Astragalus spp.	-	-	-	-	-	.00
F	Astragalus utahensis	1	-	1	-	.00	-
F	Camelina microcarpa (a)	-	6	-	4	-	.02
F	Calochortus nuttallii	6	10	3	5	.01	.02
F	Chaenactis douglasii	5	-	2	-	.03	-
F	Cirsium undulatum	35	32	16	13	.56	.91
F	Collomia linearis (a)	-	*14	-	6	-	.05
F	Comandra pallida	7	9	3	3	.06	.09
F	Collinsia parviflora (a)	8	*138	4	53	.04	.53
F	Cynoglossum officinale	-	4	-	1	-	.03
F	Draba spp. (a)	24	5	6	3	.03	.04
F	Epilobium brachycarpum (a)	10	10	5	6	.02	.03
F	Erodium cicutarium (a)	1	*38	1	15	.00	.89
F	Eriogonum racemosum	29	21	17	15	.21	.54

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Eriogonum umbellatum	-	1	-	1	-	.03
F	Heterotheca villosa	1	5	1	2	.03	.40
F	Holosteum umbellatum (a)	1	*20	1	8	.00	.09
F	Lactuca serriola	-	1	-	1	-	.00
F	Lithospermum ruderale	-	-	-	-	.15	-
F	Lomatium spp.	-	1	-	1	-	.00
F	Lupinus argenteus	13	*45	6	20	.75	2.53
F	Microsteris gracilis (a)	-	*29	-	13	-	.06
F	Oenothera pallida	3	7	1	3	.00	.06
F	Penstemon humilis	42	29	18	12	.87	.48
F	Penstemon spp.	2	4	1	1	.00	.03
F	Phlox longifolia	-	3	-	2	-	.01
F	Polygonum douglasii (a)	8	-	3	-	.01	-
F	Ranunculus testiculatus (a)	60	*211	20	58	.20	2.04
F	Taraxacum officinale	-	5	-	2	-	.01
F	Tragopogon dubius	14	7	6	3	.08	.06
F	Viguiera multiflora	20	*6	8	3	.16	.06
F	Zigadenus paniculatus	3	7	1	3	.01	.10
Total for Annual Forbs		384	787	119	253	2.08	6.15
Total for Perennial Forbs		204	245	94	110	3.21	6.26
Total for Forbs		588	1032	213	363	5.30	12.41

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 10

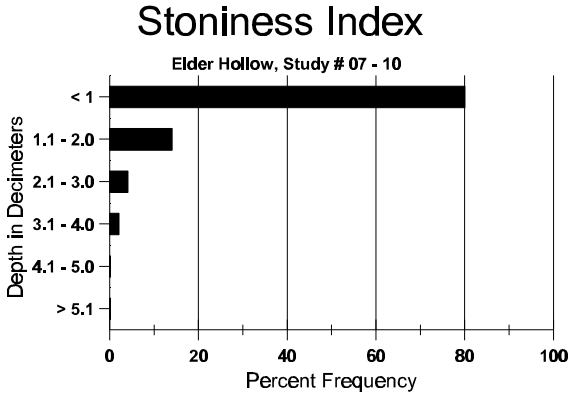
Type	Species	Strip Frequency '96	Strip Frequency '01	Average Cover % '96	Average Cover % '01
B	Amelanchier alnifolia	20	31	1.53	1.84
B	Artemisia tridentata vaseyana	74	73	21.76	18.50
B	Chrysothamnus depressus	3	3	-	-
B	Chrysothamnus nauseosus albicaulis	0	2	-	.03
B	Chrysothamnus nauseosus consimilis	1	1	-	.03
B	Chrysothamnus viscidiflorus viscidiflorus	5	10	.53	.19
B	Eriogonum heracleoides	1	1	-	.00
B	Gutierrezia sarothrae	38	42	1.24	1.41
B	Mahonia repens	4	2	-	-
B	Opuntia spp.	17	13	.54	.16
B	Prunus virginiana	1	0	-	-
B	Purshia tridentata	4	3	.56	.53
B	Symphoricarpos oreophilus	38	46	3.80	6.99
B	Tetradymia canescens	14	14	.21	.46
Total for Browse		220	241	30.20	30.17

BASIC COVER --
Herd unit 07 , Study no: 10

Cover Type	Nested Frequency '96	Nested Frequency '01	Average Cover % '96	Average Cover % '01
Vegetation	461	445	41.93	46.54
Rock	330	295	22.34	19.41
Pavement	255	281	4.72	4.82
Litter	487	459	43.82	38.67
Cryptogams	54	27	.26	.32
Bare Ground	221	260	6.30	13.25

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 10, Elder Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.1	38.4 (13.2)	7.0	48.2	27.1	24.7	3.7	16.6	198.4	.6



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 10

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Rabbit	1	4	104	N/A
Elk	27	3	104	8 (20)
Deer	45	39	1331	102 (253)
Cattle	-	-	70	6 (14)

BROWSE CHARACTERISTICS --
Herd unit 07 , Study no: 10

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
Y	96	-	-	1	-	-	1	-	-	-	2	-	-	-	40			2
	01	2	-	-	-	-	-	1	-	-	3	-	-	-	60			3
M	96	-	5	9	3	4	3	-	-	-	24	-	-	-	480	22	29	24
	01	2	5	11	3	14	3	1	-	-	38	-	1	-	780	23	30	39

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	35%	54%	00%	+38%
'01	45%	33%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'96	520	Dec:	-
	'01	840		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
Y	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	96	17	52	25	-	-	-	-	-	-	94	-	-	-	1880	20	44	94
	01	25	32	3	2	1	1	-	-	-	64	-	-	-	1280	22	39	64
D	96	4	11	9	-	-	1	-	-	-	21	-	-	4	500			25
	01	6	21	13	-	-	1	-	-	-	29	-	1	11	820			41
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	880			44
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	560			28

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	50%	28%	03%	-16%
'01	50%	17%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	2540	Dec:		20%
'01	2140			38%

Chrysothamnus depressus																		
M	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	7	17	5
	01	3	2	-	-	-	-	-	-	-	5	-	-	-	100	5	16	5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	+ 0%
'01	40%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'96	100	Dec:	-
'01	100		-

Chrysothamnus nauseosus albicaulis																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	50	53	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'96	0	Dec:	-
'01	40		-

Chrysothamnus nauseosus consimilis																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'96	20	Dec:	-
'01	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	11	19	6
	01	7	3	3	4	-	-	-	-	-	17	-	-	-	340	8	75	17

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	+53%
'01	18%	18%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	160	Dec:		-
'01	340			-

Eriogonum heracleoides																		
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	8	15	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	+ 0%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	20	Dec:		-
'01	20			-

Gutierrezia sarothrae																		
S	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	96	35	-	-	-	-	-	-	-	-	35	-	-	-	700			35
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	96	170	-	-	-	-	-	-	-	-	170	-	-	-	3400	8	12	170
	01	149	-	-	-	-	-	-	-	-	149	-	-	-	2980	7	8	149
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	-24%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	4100	Dec:		-
'01	3100			-

Mahonia repens																		
M	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	4	4	5
	01	5	-	-	4	-	-	-	-	-	9	-	-	-	180	2	3	9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	+44%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	100	Dec:		-
'01	180			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
Y	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	96	24	-	-	2	-	-	-	-	-	25	-	1	-	520	4	12	26
	01	12	-	-	2	-	-	-	-	-	14	-	-	-	280	4	8	14
D	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	07%	-39%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	560	Dec:		4%
'01	340			0%

Prunus virginiana																		
M	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'96	20	Dec:	-
'01	0		-

Purshia tridentata																		
M	96	-	-	4	-	-	-	-	-	-	4	-	-	-	80	10	51	4
	01	-	1	2	-	-	-	-	-	-	3	-	-	-	60	9	50	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	100%	00%	-25%
'01	33%	67%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'96	80	Dec:	-
'01	60		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
Y	96	10	1	-	-	-	-	-	-	-	11	-	-	-	220			11
	01	6	-	-	1	-	-	-	-	-	7	-	-	-	140			7
M	96	27	5	-	19	-	-	-	-	-	51	-	-	-	1020	21	30	51
	01	31	4	1	10	-	-	6	-	-	51	1	-	-	1040	22	33	52
D	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	10%	00%	02%	- 5%
'01	07%	02%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	1260	Dec:		2%
'01	1200			2%

Tetradymia canescens																		
Y	96	5	-	-	1	-	-	-	-	-	6	-	-	-	120			6
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	96	16	-	-	-	-	-	-	-	-	16	-	-	-	320	8	18	16
	01	15	3	-	1	-	-	1	-	-	20	-	-	-	400	9	14	20
D	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	04%	- 8%
'01	14%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	480	Dec:		8%
'01	440			5%

SUMMARY

HERD UNIT 7 - KAMAS

Nine trend studies occur in Wildlife Management 7. These studies were established in 1984 and reread in 1990, 1996 and 2001. In 1996, the Kamas Water Tanks trend study was moved and renamed Elder Hollow (7-10). In 2001, Stevens Hollow (7-1) was discontinued and the trend study, Above Woodland (7-9), was moved to a nearby more suitable location. Due to the change, the Above Woodland trend study is treated like a new site with only baseline data available. All trend studies sample big game winter ranges, however 5 trend studies are above 7,000 feet making them available only during normal winters.

Averages soil trends for the 7 trend studies read in 2001 is 2.4 or slightly down. Three trend studies displayed stable soil trends but Pinyon Canyon (7-2), Above Samak (7-4), Provo River Canyon (7-7), and Elder Hollow had slightly down soil trends. The main factor in these declining trends was an increase in percent cover of bare ground and a general decline in litter cover. Percent cover of bare ground declined an average of 56% between 1996 and 2001(10% to 22%). Average litter cover declined from 47% in 1996 to 39% in 2001. Herbaceous cover also declined on some sites. The main cause of these trends is drought. Precipitation data from Kamas indicate below normal annual precipitation in 1999, 2000, and 2001. Spring precipitation (April-June) has been especially poor for the past 2 years. Spring precipitation is critical for herbaceous plants and shrub recruitment. In 2000, spring precipitation, April through June, was only 55% of normal. April and June precipitation was exceptionally poor at only 44% and 17% or normal respectively. In 2001, spring precipitation was 79% or normal but May and June were very dry. April precipitation was above normal but May precipitation was only 28% of normal and June 19% of normal (Utah climate summaries 2001).

Trend studies were originally established in 1984 during the middle of an extended wetter than normal period. Conditions were dry during the 1990 reading and wet for the 1996 reading of these trend studies. Annual precipitation was above normal from 1982 to 1986. Drier than normal to normal conditions prevailed from 1987 to 1992. Precipitation in 1995, 1996, and 1998 were above normal.

Average browse trends are 2.9 or nearly stable. All sites had a stable browse trend except for Provo River Canyon which had a slightly down browse trend. This site has a very dense sagebrush population which is showing the effects of drought conditions combined with intense interspecific competition. The average herbaceous trend is 3.7 or slightly up. Many sites showed an increase in perennial grass and forb sum of nested frequency.

A summary table of trends follows.

TREND SUMMARY

Location	Category	1984	1990	1996	2001
7-1 Steven's Hollow	soil	est	3	4	susp
	browse	est	1	1	susp
	herbaceous understory	est	3	3	susp
7-2 Pinyon Canyon	soil	est	3	4	2
	browse	est	2	4	3
	herbaceous understory	est	4	4	3
7-3 Foothill Drive	soil	est	3	4	3
	browse	est	5	3	3
	herbaceous understory	est	3	3	3
7-4 Above Samak	soil	est	3	4	2
	browse	est	2	3	3
	herbaceous understory	est	3	4	3
7-6 Cedar Hollow	soil	est	3	3	3
	browse	est	3	3	3
	herbaceous understory	est	3	3	4
7-7 Provo River Canyon	soil	est	3	3	2
	browse	est	2	4	2
	herbaceous understory	est	3	2	5
7-8 Hailstone	soil	est	3	3	3
	browse	est	3	3	3
	herbaceous understory	est	3	4	5
7-9 Above Woodland	soil				est
	browse				est
	herbaceous understory				est
7-10 Elder Hollow	soil			est	2
	browse			est	3
	herbaceous understory			est	3

1 = down, 2 = slightly down, 3 = stable, 4 = slightly up, 5 = up, est = established, susp = suspended, NR = not read